

March 1940

TECHNOLOGY REVIEW

Title Reg. in U. S. Pat. Office



technology review

Published by MIT

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NORTON SERVICE

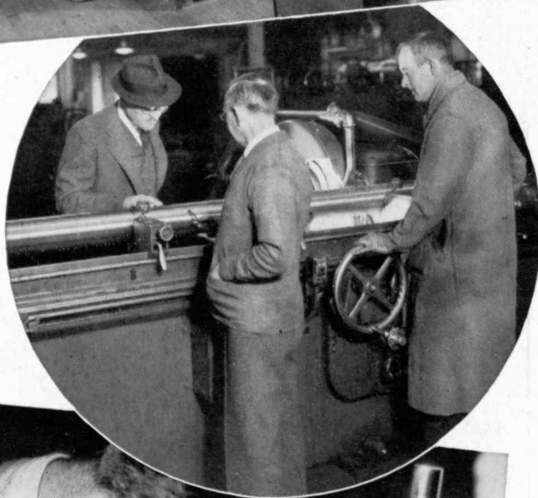


A Three Phase Distribution System

(1) In 150 cities Norton distributors carry grinding wheel and abrasive stocks for local needs. (2) Backing them are the Norton warehouses in five industrial centers with a half million stock wheels and facilities for emergency alterations of wheel sizes and shapes. (3) In the Worcester stock rooms are over 2,000,000 wheels in some 100,000 combinations of size, abrasive, bond, grain, grade and structure.

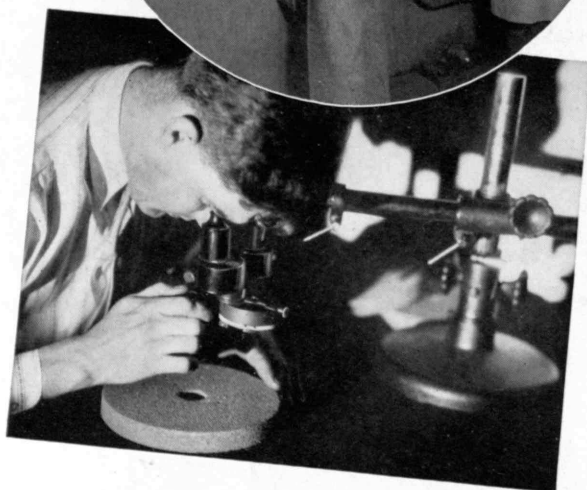
Consulting Engineering Service

Every hamlet is within reach of a representative of a Norton distributor — with experience and knowledge of the industries of the locality. Back of them is the experienced Norton field staff — operating from the Norton offices and warehouses and some twenty other industrial centers. Back of the field men are the special field engineers operating from Worcester — each a specialist in a particular type of grinding.



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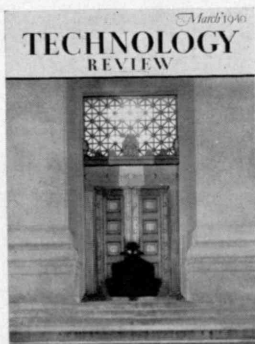
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Hartford Cleveland Hamilton, Ont.

NORTON ABRASIVES

THE TABULAR VIEW

SAFETY from accident and hazard is a matter which good management must consider unflaggingly. Discussing the whole question (page 189), FRANK L. AHERN, '14, draws upon well-rounded experience in safety work. Chief of the safety division of the National Park Service, he served from 1937 to 1939 as the first chairman of the highly effective Federal Interdepartmental Safety Council and became a member of its executive committee in 1939. Having served in France as a first lieutenant in the Chemical Warfare Service, Mr. Ahern worked on construction projects for various engineering concerns, was fire protection engineer for Stone and Webster, Inc., and then for the National Bureau of Standards before joining the National Park Service. **W. MACK ANGAS**, Commander, Civil Engineer Corps, United States Navy, whose hobby of research into the history of ocean-going steamers resulted in the recently published book, *Rivalry on the Atlantic*, was graduated from the Institute as a civil engineer in 1917. After teaching navigation for a few months, he entered the Corps of Civil Engineers of the Navy, and has had duty in Philadelphia, Hawaii, San Diego, Pensacola, New York, and Boston. He is now stationed at the navy yard in Charleston, S. C., as public works officer of that navy yard and of the sixth naval district. His description (page 192) of the beginnings of marine power plants re-emphasizes the part that ingenuity and courage play in the development of engineering. **A** comparable readiness to undertake the unusual marks the extensive solar energy research program now in progress at the Institute by reason of the fund donated by Godfrey L. Cabot, '81. **HOYT C. HOTTEL**, '24, Associate Professor of Fuel Engineering and Director of the Fuels Research Laboratory of the Department of Chemical Engineering, discusses the research (page 195) in the light of his share in it as chairman of the joint Solar Energy Conversion Committee which brings to bear on it the varied resources and techniques of several Institute Departments. **HARRY M. GOODWIN**, '90, Dean of the Graduate School, completes this month (page 197) the survey of the origin and development of the School, a survey which he commenced in the February Review. Growth in facilities and numbers has been steady since the administrative organization of the School shortly after Dr. Compton became president of the Institute. **The shadowy figure which each night occupies the entrance to the Eastman Building is variously known as Wavelength Willie, or the Dormitory Goblin, or the Crown of the Physical Sciences. He graces this month's cover through the work of Herbert A. Stein, '41. The leering individual high above the goblin's head is as yet unnamed.**



No. 23

Just for Fun! A CHALLENGE TO YOUR INGENUITY

HAVING no money, an explorer used a sixty link piece of gold watch chain to "buy" sixty days' lodging from a trapper. Each day they squared accounts without using any other commodity. What procedure was required to make payments at the rate of one link per day with the least number of cuts in the chain?

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○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○
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Hint 1.—Believe it or not, only 3 cuts are needed!

Hint 2.—Linkspaid incanberetur nedascha nge.

Answer.—Cutan dusel inksfi ve, fourte enan d thirt y-onet opa yforfir sthree eda ys, etc.

The originator of this fine puzzle deserves congratulations. Can you tell us who it is?

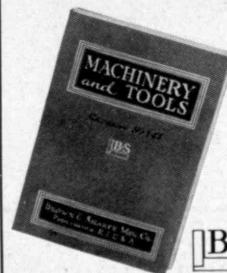
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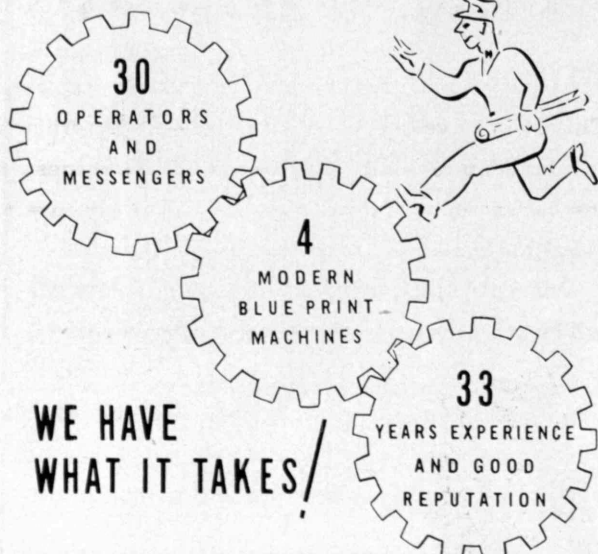


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A. L. Weil '01

MAIL RETURNS

Storage of Metals

FROM HERBERT B. DWIGHT:

The absorbing article by Professor Robinson in the February Review [page 152], on the needs in raw materials and in production facilities for a wartime emergency, seems to give rise to the question: What provision is being made for storage of metals to be used in such an emergency?

Three objections to such advance storage can be envisaged, namely, the cost of purchasing the metals if it were done by selling bonds, the cost of storing and guarding the metals, and, finally, the threat which the metal industries would feel if there were stocks of metals which could be thrown on the market, possibly in peacetime and in a depression, with a disastrous effect on prices.

If some foreign countries could be found which were in a position to accept, and showed some probability of keeping, a quantity of gold in exchange for manganese, tin, chromium, antimony, mica, tungsten, and other storable items in the long list, a national asset might be built up here with no expense for bond interest, and possibly with some use being made of the storage facilities provided for gold. The threat to domestic prices should be minimized by specific promises or guarantees, and there are few more trustworthy guarantors than the Treasury Department, which presumably would be the holder of the stocks of metals.

M.I.T., Cambridge, Mass.

Another Cause for Yellow Fever

FROM WILLIAM N. TODD, '04:

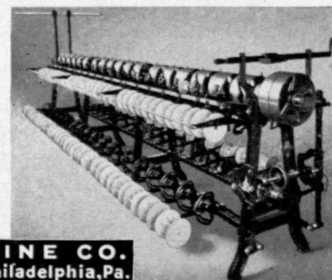
Among the old papers in my library, I remembered and located an old Jonathan Plummer sermon that touches on the 1793 Philadelphia yellow-fever epidemic. This ascribes the scourge to cause very different from your results of careful scientific investigation (The Review, November, page 20) but emphasizes the trend of mind in those days. Plummer, who described himself as "a latter-day Prophet, Lay-Bishop, travelling Preacher, Physician, Poet and Trader," wrote in 1812: "Long I expect the descendants of Europeans who lived in the territory now called the United States, behaved so well, that they were highly blest by their Almighty Maker. Stately towns and cities were built, religion flourished, and the deferts bloomed as it were like a blooming rofe; but alas! a dreadful alteration was found in the behaviour of people and soon the King of Glory . . . began to alter his benign behaviour, in regard to the treatment he deigned to give to the people of the States. A book written by an infamous villain, a vile heaven daring, hell defying drunkard, named *Thomas Paine*, directly against the sacred scriptures, was published I expect at the Southward, and so cordially received, that soon, figuratively speaking, the vindictive ire, the Almighty vengeance, of the King of Kings began to smolder and blaze! This abominable production, I expect had been but a short time in Philadelphia before a ruthless fervant of the Lord, called a yellow fever, with unrelenting fury, killed more than Five Thousand of the inhabitants of that city in a fingle (Concluded on page 214)

FIDELITY DRUM SPOOLING MACHINE

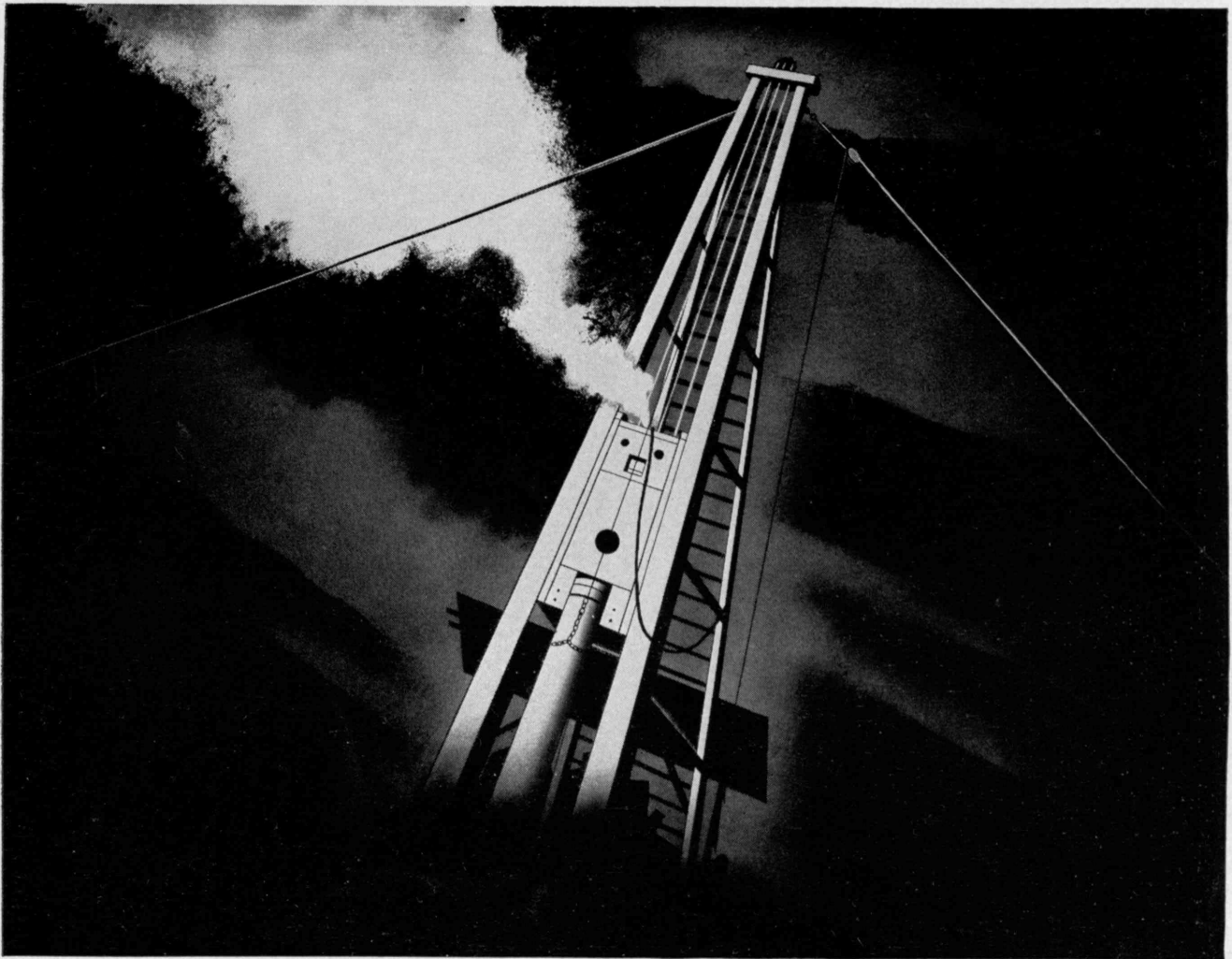
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outflow of a min-
iature lake at
Monroe, N. Y.

G. A. Makaroff, '26

THE TECHNOLOGY REVIEW

Title Reg. U. S. Pat. Office

EDITED AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

VOL. 42, NO. 5

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From a photograph by Herbert A. Stein, '41

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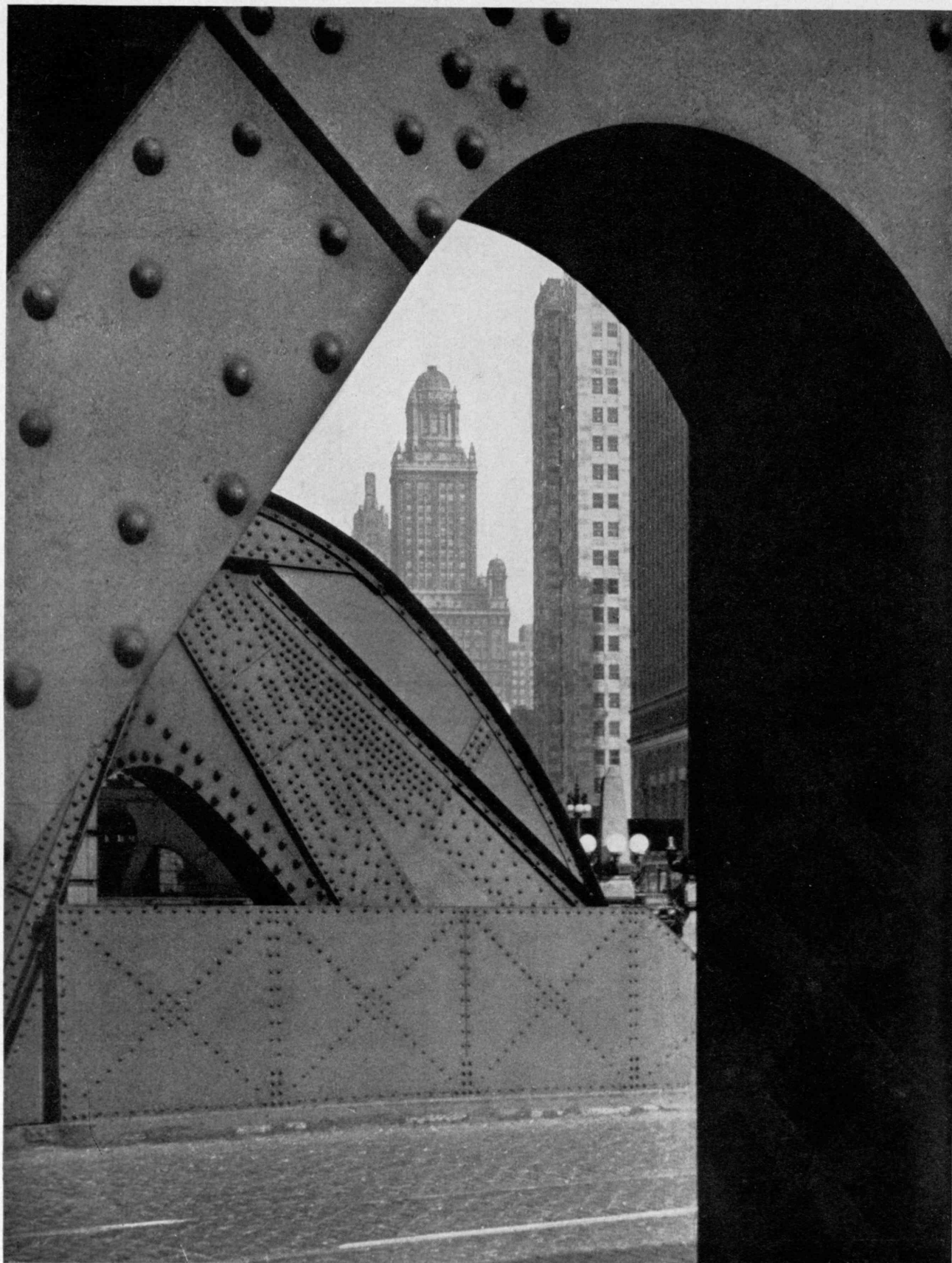
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PUBLISHED MONTHLY FROM NOVEMBER TO JULY INCLUSIVE ON THE TWENTY-SEVENTH OF THE MONTH PRECEDING THE DATE OF ISSUE AT 50 CENTS A COPY. ANNUAL SUBSCRIPTION \$3.50; CANADIAN AND FOREIGN SUBSCRIPTION \$4.00. PUBLISHED FOR THE ALUMNI ASSOCIATION OF THE M.I.T. FRANK B. JEWETT, PRESIDENT; RAYMOND STEVENS, A. WARREN NORTON, VICE-PRESIDENTS; CHARLES E. LOCKE, SECRETARY; RALPH T. JOPE, TREASURER. PUBLISHED AT

THE RUMFORD PRESS, 10 FERRY STREET, CONCORD, N. H. EDITORIAL OFFICE, ROOM 3-219, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE A, MASS. ENTERED AS SECOND-CLASS MAIL MATTER AT THE POST OFFICE AT CONCORD, N. H. COPYRIGHT, 1940, BY THE ALUMNI ASSOCIATION OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY. THREE WEEKS MUST BE ALLOWED TO EFFECT CHANGES OF ADDRESS, BOTH OLD AND NEW ADDRESSES SHOULD BE GIVEN.



M. Gurrte

CLIMAX IN STEEL

Eastward through the Franklin Street Bridge over the Chicago River toward the Pure Oil Building

(182)

THE TECHNOLOGY REVIEW

Vol. 42, No. 5



March, 1940

The Trend of Affairs

Inflated Concrete Cores

A TREND in building construction which has not yet been felt in this country but which has been growing in Europe for the past two years is the use of inflated canvas and rubber forms to cast long cavities in concrete structures. The technique greatly reduces weight without seriously impairing strength, and, because it saves money by conserving materials and speeding up erection, may offer possibilities in development of prefabricated structures, where light weight, speed, and economy in construction would be advantages.

Using a patented pneumatic-core system, fully described in a recent issue of *Compressed Air Magazine*, the method has been practiced both for precasting and *in situ* casting of floors, beams, walls, and columns in public buildings, apartment houses, industrial plants, theaters, and other buildings, particularly in England. The decreased weight not only facilitates construction but also reduces proportionately the necessary amount of supporting steelwork; and the saving in materials is said to be about 20 per cent greater than that in any other method of hollow construction, including the use of hollow bricks. Such bricks, because they become part of the structure, add considerably to the cost.

Vaguely similar in construction to automobile tires are the pneumatic cores, which are inflated to five pounds a square inch and imbedded in the concrete as the customary reinforcements are. The cores are long rubber tubes encased in canvas or, for quantity production, in heavy kraft paper. Thinner than they are wide, they resemble elongated pillows and are placed parallel to each other, a few inches apart, and running the whole length of the form. Two or three feet of the tube and casing are allowed to protrude beyond the end of the form to facilitate withdrawal. Three or four hours after the concrete is poured, the rubber cores are deflated

and withdrawn. The canvas casings are pulled out by means of a long tape which runs the length of the casing and is attached to the closed end of it. This operation turns the casing inside out while peeling it away from the still wet wall. Tubes and canvas casings can be used repeatedly and are good for about twenty-four months and six months, respectively. Paper casings, when they are used, are not retrieved.

Precast floor or wall sections are found to be practical up to a length of about fifteen feet and are now available in a number of standard sizes. Standard walling is 15 feet long, 14 inches wide, and 5 inches thick; it is composed of two slabs, each 1½ inches thick, held apart by numerous galvanized steel ties to form an unobstructed air space for insulation. By the use of brick, sand, or stone dust, or some other pleasing material, an exterior finish is applied while the concrete is still moist. A brick wall can be imitated by arranging thin bricks in the bottom of the mold before the concrete is poured. The interior is left smooth. Construction from these precast sections is rapid, of course, because there are no forms to set up, there is no delay for hardening, and the materials are light and easy to handle.

Where precast sections do not meet the requirements, flooring can be laid *in situ* by the same method. A floor of this type has been placed in the great Anglican Cathedral now being erected in Liverpool, England.

Any Time You're Ready, Boys

IT is now permissible, has been for the past century, and will be for the next hundred years or so, to celebrate the three-thousandth anniversary of the birth of the Iron Age. At least, that seems the consensus among archaeologists, who believe that not until about 1000 B.C. was iron in daily and extensive use. A likely point of origin in Europe is the area marked by the Hallstatt

burials, about thirty miles southeast of Salzburg, Austria. It is possible, however, that the Philistines in Palestine were using iron weapons and agricultural tools a century previous.

For maximum appropriateness, it might be well to hurry the celebration, for it would be fitting to honor the start of the iron industry in a year of record production, and the frequency with which steel records are made seems to be slowing up. The decade ending in 1939, for instance, was the first in the history of the United States as an industrial power when total steel production was less than in the previous decade. Still, the country made more steel in the last three months of 1939 than in any other three consecutive months in its history, while Germany, Soviet Russia, and Japan set new yearly records for their respective countries. But world output was a trifling two million tons under the peak set in 1937.

Iron was known far earlier than three thousand years ago, but its use was quite overshadowed by that of copper and bronze. To the metallurgist of antiquity, the difficulties of smelting even the most tractable iron ore were enormous. In fact, the earliest iron specimens — beads from neolithic graves south of Cairo, Egypt, dating from about 4000 B.C. — were obtained from a meteoric body, as is indicated by their nickel content of 7.5 per cent. Other ancient articles of iron are likewise not of terrestrial origin.

As late as 1287 B.C. or thereabouts, Khattusil III was forced to tell his contemporary, Ramses II, that "regarding your writing me for pure iron, pure iron is not available in Kizzuwadni in my store house. I have written to get iron, and they will bring pure iron, but as yet they do not have it on supply. As soon as they get a supply I will send it to you. In the meantime I have sent you an iron sword blade." By contrast, the apparent consumption of finished steel per family in 1937 was, in this country, 2,440 pounds.

Rock into Cold

WATER from the rock was a miracle to Moses; dry ice from the rock appears to be a coming commonplace to us, with the construction of a successful retort-type kiln for the distillation of pure carbon dioxide gas from limestone. Experimentation with the distillation of limestone, commenced over ten years ago by Edward P. Gillette, was basis for the evolution of a practical operating kiln, made possible by the availability of a suitable refractory. A flue constructed of this material, enclosed within an insulated firebrick wall, discharges the lime through an air-seal quadrant gate with water-cooled bearings. The hot CO_2 gas distilled from the limestone is put through a scrubber which removes lime and limestone dust, and then through an electrical precipitator which cuts out the common salt that is found in appreciable quantity in the CO_2 distilled from some limestones.

At present, says *Rock Products*, the output of the commercial plant now in operation is compressed into dry ice and is marketed directly throughout two states. Observers feel that a large chemical industry yet to be born may depend upon the calcination of limestone,



H. Armstrong Roberts

A deceptive pattern of lights and darks is presented by this close-up of a huge gear wheel.

arguing that carbon dioxide gas need not be used as dry ice only but could be basis for a large number of organic chemical products. It is pointed out, also, that dry ice is a far more valuable product than lime and that since a high-grade limestone is nearly half CO_2 , the manufacturer who burns the stone for lime only must discard by far the most valuable part of his raw material.

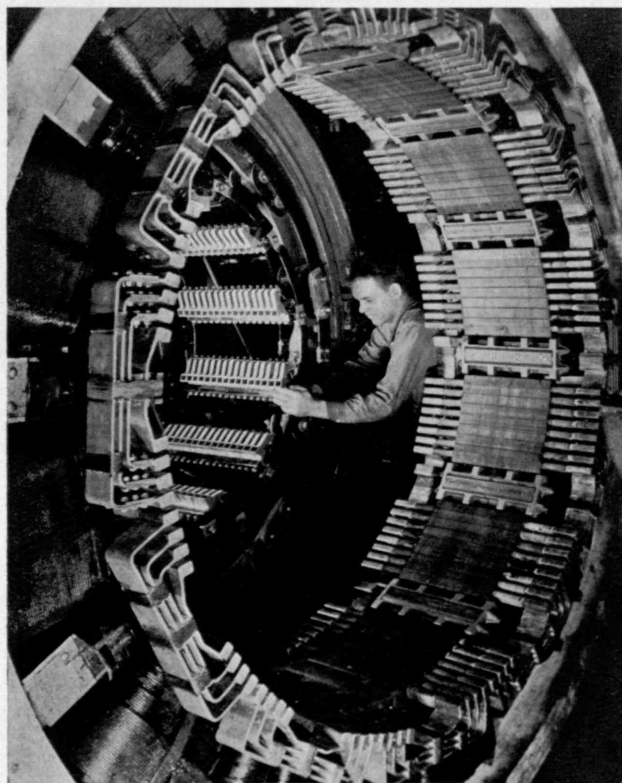
High-Speed Steel's Secret

UPON a subtle difference between ordinary tool steel and the alloy which is known as high-speed steel depend in large measure the mass-production techniques that are the keynote of modern industry. Tool steel must of course be very hard to begin with, but if in use it is heated beyond 400 degrees Fahrenheit, it softens rapidly. If industry had to depend upon ordinary tool steel — as it did prior to 1900 — mass production would be impossible, because it requires speeds of operation which this steel cannot stand. The development of high-speed steel — an alloy of 18 per cent tungsten, 4 per cent chromium, and 1 per cent vanadium, plus the ingredients of ordinary tool steel — makes possible cutting tools which retain their hardness and hence their ability to do work even when they are operated to a dull-red heat.

In the heat treatment of both kinds of steel, two steps are involved: First, the steel is hardened by being quenched — that is, suddenly cooled — from a fairly high temperature. Second, it is tempered — that is, reheated to a moderate temperature in order to be toughened. Ordinary tool steels must be tempered below

450 degrees Fahrenheit; otherwise they become too soft for use as cutting tools. High-speed steels if tempered at this temperature will likewise soften in use. But if they are tempered at about 1,050 degrees Fahrenheit, the high-speed steels recover their original hardness. Since this secondary hardening is obtained at a high tempering temperature, high-speed steel tools are able to retain their hardness and cutting ability at the high temperatures developed by rapid cutting speeds. Evidently, this secondary hardening is the secret of the valuable properties of high-speed steel.

What makes it possible for high-speed steels to undergo this secondary hardening and consequently to remain hard at high cutting speeds? The answer to this question is of direct practical value to metallurgist and industrialist alike in so far as it may be expected to contribute to better controls in the making of high-speed steel tools. Allied questions grow out of the fact that though the rate at which ordinary tool steel is cooled from the tempering heat does not matter greatly, high-speed steels must be cooled slowly lest they crack. With ordinary tool steels, moreover, the properties of the finished tool remain the same whether tempering is all done in one treatment or is spread out through several treatments totaling the same period of tempering time, whereas repeated tempering of high-speed steels gives a much longer tool life. Although many heat treaters are aware of these anomalies in high-speed steel, their knowledge has remained pragmatic, empirical, without the basis of theory which might be expected to lead to a more effective utilization of the inherent capabilities of this basic material.



Allis-Chalmers Electrical Review

Assembling brushes on the yoke of a large direct-current motor for steel-mill service

Study of the fundamental mechanism of the tempering operation, involving necessarily a theoretical approach to these questions, was hence undertaken in the laboratories of the Institute's Department of Metallurgy some time ago. Morris Cohen, '33, Assistant Professor of Physical Metallurgy, has been directing the program, from which definitive answers to the problems have been secured. Hardening a great many specimens of high-speed steel under controlled conditions, tempering them at temperatures ranging from 212 through 350, 550, 750, 900, to the standard heat-treating temperatures of 1,000 and 1,050 degrees Fahrenheit, and for periods ranging from one minute to several hundred hours, Professor Cohen then applied many measuring techniques to find out what had happened inside the alloy. Microscopic, x-ray, electrical-resistance, hardness, magnetic, specific-volume, and dilation measurements all added something to the final picture. At three of the temperatures, tempering was done by both single and repeated treatments.

Through this work, the secret was found to lie in a peculiar phase transformation which occurs as a result of the tempering of high-speed steel. Ordinary tool steel is hardened by being heated to a high temperature in order that part of it may be converted to the solid solution called austenite. Quenching turns austenite into the hard structure known as martensite, which is toughened and softened slightly by the subsequent tempering process. With high-speed steels, however, quenching does not give a full martensitic structure; some of the austenite is retained at room temperature because the alloying elements present in the high-speed steel make the austenite too sluggish to transform into martensite during the quenching operation. Upon being reheated, for tempering, to between 1,000 and 1,050 degrees Fahrenheit, some of the alloy carbides precipitate out of the austenite, reducing its sluggishness and permitting it to transform into martensite during the cooling that follows. This delayed conversion produces the phenomenon known as secondary hardening.

Tempering thus is seen to be merely a conditioning treatment that controls the amount of austenite which will transform during subsequent cooling. The change from austenite to martensite involves a large increase in volume, which may mean high internal stresses and consequent cracking, since the austenite transforms not at the tempering heat of 1,050 degrees but only during cooling to temperatures at which the steel becomes relatively cold and nonplastic. This explains the need for slow cooling from the tempering temperature. Spreading out the tempering operation through repeated rather than single tempering, and controlling the rate of cooling after each heat treatment, serve to distribute the transformation over a number of cooling cycles, and the internal stresses thereby introduced are relieved during the following heating cycles. Here is the reason for the improved tool life which results from repeated tempering.

Plant practices, it is expected, will be changed as a result of this research. Controlled cooling, for instance, will be found desirable to prevent cracking in large and complicated tools with sharp corners. Inquiries concerning applications of the results have already been

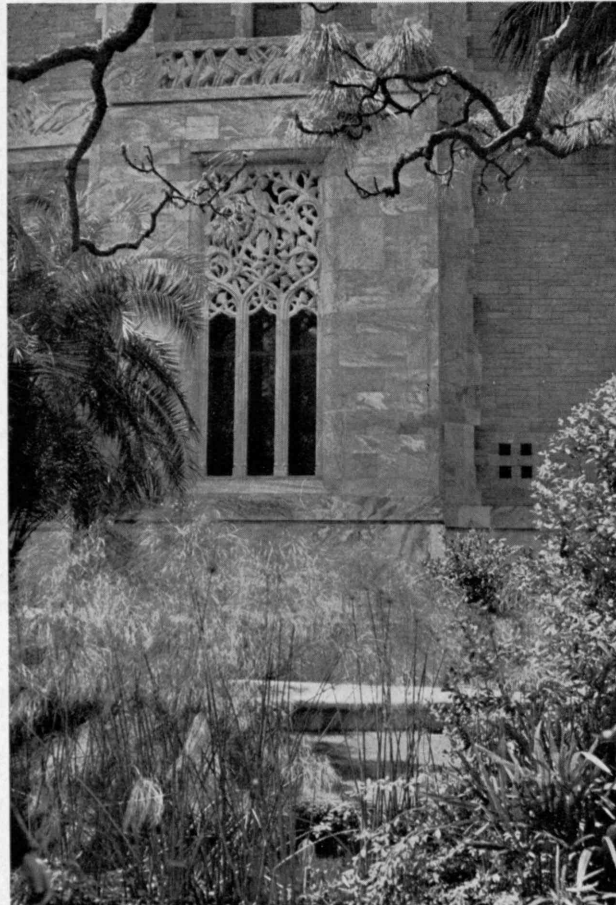
received from numerous firms interested in service tests, and bid fair to exceed the laboratory's present capacity. One practical test supervised by Professor Cohen utilized leather-cutting knives, one tempered by the standard single-shot process, the other tempered, in the light of this research, for the same length of time but in three treatments. The second knife, at last reports, had worked three times as long in service as the first and was still going strong.

Who's What

FIELD work is in mid-course at present on the fourth complete census of the nation's business activities, enumeration of which began in January and was expected by the Bureau of the Census to be completed in about five months. Results, by kinds of business, are to be released as fast as they can be prepared. The first business census was taken for 1929, and the last nation-wide enumeration was made in 1936, covering activities for the year before. A sample census of some 100,000 retailers and 18,500 wholesalers was made early in 1938 and provided valuable data.

For the present business census, the country has been blanketed by a system of 103 areas split up into 550 supervisor districts and, further, into 12,000 enumeration districts. About 1,700,000 retailers are being covered; other classifications include 50,000 theaters and places of amusement, 50,000 hotels and tourist camps or courts, 750,000 service businesses, and 200,000 builders and contractors.

The detail involved in the present census is easily gauged from the data being sought from members of this last group. New information asked of contractors this year includes the breakdown of contracts and orders into those for new one- and two-family houses; new housekeeping residential buildings, such as apartments; new industrial buildings, such as factories, mills, plants, warehouses; and commercial, office and institutional buildings. Information is likewise being collected regarding contracts or orders received, work sublet, total work done in 1939, and total work done by location. Materials used, mechanical equipment installed, and merchandise sold in 1939, number of employees, and total pay roll for the year are other items covered. A seasonal employment index will be



W. W. Lewis, '89

Romantic luxuriance — a window of the Singing Tower, the carillon at Lake Wales, Fla.

secured through the request for a record of the number of paid workers on the fifteenth of each month through the year, and a cross section of pay-roll classifications will be shown through the section requesting employment and pay-roll figures for a typical week.

Heat, Cold, Health

UNTIL recently, for the body temperature to shift more than a few degrees from normal (98.6 degrees Fahrenheit) was considered omen of impaired health. A few cases on record show that patients have reached temperatures as high as 110 or 112 degrees Fahrenheit before death. In contrast, there are reports of man's having reached record lows of about 80 degrees Fahrenheit after excessive use of ethyl alcohol, the nearest thing we have to a human antifreeze. But now, carefully regulated extremes of body tempera-

ture are being used in attempts to burn out and freeze out disease. The success of these applications of physical science to therapeutics, which has been particularly pronounced during the past year, depends upon the fact that man, surprisingly enough, is a relatively hardy species. He can be made to withstand abnormal temperatures while certain parasitic germs, pampered by long residence in his thermostatically controlled body, die of heat exhaustion and while malignant growths are starved in the cold.

Fever therapy for gonorrhea, arthritis, syphilis, stubborn pelvic infections, St. Vitus's dance, asthma, and other afflictions is far from new, but it has only recently recovered from the ill repute it was given by abuses in earlier days. The use of radio waves (short-wave diathermy) and the deliberate introduction of malaria or typhoid fever are now being joined by the use of air-conditioned cabinets heated by steam, hot water, or hot air. The cabinet offers particularly good possibilities of accurate control, in the opinion of some physicians. Since it is necessary in fever treatment to maintain the body within the narrow range between the temperature which will kill the bacteria and that which will kill the patient, precision of control is an important factor.

At the other end of the temperature scale, Dr. Temple Fay of Temple University started work in 1932 on the "frozen sleep" treatment of cancer. Surprisingly low

body temperatures have been attained safely by this method, and patients have been maintained five to eight days at between 85 and 90 degrees Fahrenheit. Dr. Fay reported at conventions last fall that the treatment had been tried with marked relief of symptoms in eighty cases, all of them "hopeless" malignancies, in which patients had been given about six weeks to live.

At first the cold was to be used only for its narcotic effects. But, although it will take about five years to be sure that relapses do not occur, the treatment appears to starve the abnormal cancer cells, which need constant food supplies to maintain their rapid growth, by reducing the normal body metabolism nearly to nil. This is hibernation, a faculty previously attributed only to certain lower animals.

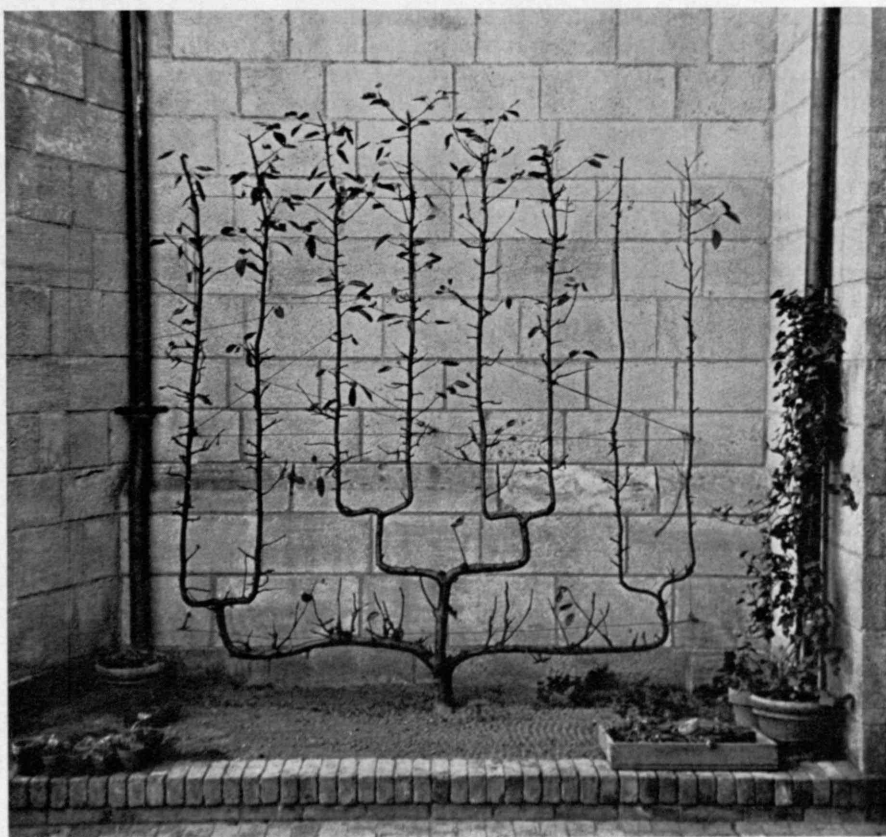
Usefulness of the frozen-sleep treatment, it is suggested, may extend considerably. Cancer patients are observed to enjoy improved nutrition and, contrary to some predictions, do not develop respiratory disorders even when pneumococci are known to be present. It seems possible that the hibernation gives the body a chance to concentrate on the reinforcement of its natural defense mechanisms while the microbes are dormant. The next step may be to try cold in malaria, typhoid fever, some heart ailments, and perhaps other diseases.

Human hibernation, however, is not entirely new. Report is that it has long been the custom of poverty-stricken villagers in the Russian steppes, during long cold winters, to lie down in large groups, allowing the cold gradually to affect their bodies until they enter a hibernation period during which sleep continues for several weeks, thus conserving the village's supply of food and fuel.

Omnium Gatherum

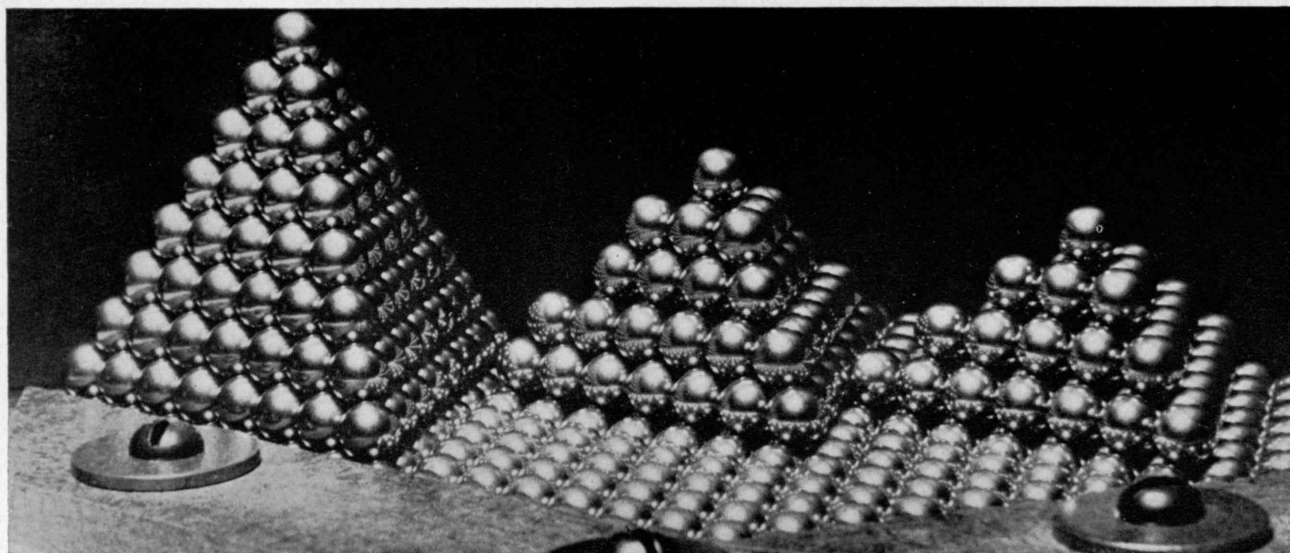
ACCCELERATION in the rate at which we put discoveries to work is suggested by the issuance of a patent on the use of heavy water to produce from Rochelle salt piezocrystals highly active over a wider range of temperature than previous crystals. The piezoelectric effect, by which crystals of certain structure vibrate or warp when electric currents of proper frequency are passed through them, or by which they produce electric currents when oscillated mechanically, has numerous applications in loudspeakers, microphones, relays, and similar devices. At temperatures above 74 degrees Fahrenheit, the usual Rochelle salt piezocrystals lose their activity. Crystallize the Rochelle salt from a solution of heavy water, how-

ever, and the resulting crystals maintain high activity even at 100 degrees Fahrenheit. Noteworthy is the fact that about a generation elapsed between the discovery of the piezoelectric effect by the Curies in 1880-1881 and suggestion of use for it in 1918 by P. Langevin. Heavy water — differing from ordinary water in that its hydrogen atom is twice the atomic weight of ordinary hydrogen — has, by contrast, been a laboratory curiosity for but some seven years. Concentration of the hydrogen isotope called deuterium brought the Nobel Prize in chemistry to Professor Harold C. Urey of Columbia in 1934; deuterium oxide, or heavy water, had then been under study for about a year. Since that time, investigators in numerous fields have been testing its properties on living organisms and in chemical reactions to find practical applications for it. This recent patent, assigned to the Bell Telephone Laboratories, covers what appears to be the first such use. ¶ What proper insulation can do for a dwelling by way of conserving heat is suggested by studies carried out in two identical four-room houses in the Hiwassee Dam construction community under the Tennessee Valley Authority. One house was insulated throughout by wool bats in the walls and over the ceiling and by insulating board under the floor joists. Doors of both houses were weather-stripped; the families occupying the two houses maintained the same schedule of window-opening and window-closing. Electric heaters in the houses were turned on and off at the same time. Reduction in total heat loss in the insulated house was 44.75 per cent. ¶ A wood-burning stove designed to heat two or three rooms; to use waste wood, trimmings, thin sticks, as



Ascetic simplicity — an espaliered tree in the gardens of the Cloisters in New York

R. W. St. Clair, '36



R. P. Johnson, '36

The crystalline structure of various metals is depicted in these piled spheres — quarter-inch steel balls here arranged to fill space as densely as they can. Such arrays begin with a hexagonal base plane of spheres as closely packed as possible. On this, other spheres are piled in various solid figures. At the left above is a regular tetrahedron, exposing 111 faces, compared to the 100 exposed in the cube corner at the right, though both are piled on base planes of 111. The lattice arrangement in both is face-centered cubic. The middle pile is a different lattice: the hexagonal close packed, less symmetrical than the other but just as densely packed. Some metals — aluminum, silver, gold, for example — crystallize in the face-centered cubic lattice; others, such as beryllium, magnesium, cadmium, in the hexagonal close-packed; still others — tungsten, tantalum, molybdenum are examples — prefer the body-centered cubic lattice, which cannot easily be represented in this manner.

well as regular fuel wood; to hold a fire for as long as an anthracite-burning stove can go without being stoked; and, in addition, to burn its fuel up clean, with a minimum of smoke or gas, has been developed in Connecticut, where the Connecticut Forest and Park Association is seeking to further reforestation. The stove, in design of which Professor Lauren E. Seeley of Yale co-operated, is expected to help in this movement by providing for economical use of the undergrowth and thinnings that must be periodically cut out of wooded areas if reforestation is to be scientifically done. The new stove burns wood with an estimated 90 per cent efficiency. ¶ Dry-ice refrigeration is regarded as offering valuable possibilities, which would be exploited by a refrigerating machine that has recently been developed on the West Coast. In the device, an insulated pressure chamber is designed to hold a block of dry ice — compressed carbon dioxide — and a small pump. Power to operate the pump is supplied by the evaporation of the dry ice. A pool of alcohol lying below the block of dry ice is chilled to far below zero Fahrenheit, and alcohol from it is circulated by the pump through pipe coils. A thermostat cuts out the pump when the desired temperature in the storage compartments of the refrigerator has been reached. The carbon dioxide gas exhausts either to the atmosphere or to the interior of the refrigerator. A plentiful supply of dry ice is an essential to commercial exploitation of the device. ¶ A new gauge “glass” of a nonbreakable transparent plastic is in the form of a cover which threads onto the gauge case itself, opening up the dial of the gauge and making it easier to read. Crystal clear, with a tensile strength of about 5,000 and a compression strength of about 15,000 pounds a square inch, the new cover is declared to make the gauge case moistureproof and dustproof. ¶ Plastics find another new use in gunstocks. A shotgun equipped

with stock, fore end, and sight piece of a cellulose acetate plastic has been put through firing tests while clamped against a solid block so that the stock should receive full recoil. Though the hard rubber butt plate crumbled from repeated shocks, the plastic stock showed no fracture or distortion, and it likewise withstood acids, alkalis, salts, alcohols, and other reagents, many of which would be rarely, if ever, found in a hunter's usual equipment. ¶ Casein paint, in the manufacture of a gallon of which a gallon and a half of skim milk are necessary, is advocated for striping white lines along the miles of America's highways, and thus for helping solve the problem of a skim-milk surplus, as well as the problem of the farmer's income. Development of a new machine calculated for the manufacture of casein on the premises — obviating the need of shipping skim milk to casein plants long distances away — is stressed as offering marked possibilities to farm groups. ¶ The farm has another possibility in corn, report has it: Zein, a by-product of corn processing, is a protein from which plastics, waterproof wrappers, quick-drying inks, films, and fibers can be made. A pound of zein can be got from a bushel of corn. Many of its possible uses correspond closely to the industrial applications of casein. ¶ Another farm by-product is under test in the South. The sweet-potato pulp made available in the manufacture of sweet-potato starch has been found in Mississippi to put weight on cattle at the rate of five pounds a day, making good solid meat with firm streaks of fat. The pulp seems to appeal to bovine appetites, for the cows eat it day after day. A ration consisting of two-thirds pulp and one-third cottonseed meal has been used in the test feedings. Appreciable quantities of the lime added during the processing of the sweet potatoes remain in the feed and make it an especially suitable addition to cottonseed meal for fattening hogs.

Safety Is Good Management

Savings Justify Budgeting for Adequate Prevention of Accidents; Improvements in Morale and Human Welfare Emphasize Its Value; How to Organize a Program

BY FRANK L. AHERN

SAFETY programs are not new. While the co-operative efforts of a national organization may be said to have started in 1912,^{1,*} considerable attention was given to safety in the mining, railroad, and steel industries prior to 1912. For example, an act of Congress of March 3, 1891, covered the protection of lives of miners in the Territories;¹⁵ the Bureau of Mines was established in 1910 in response to the demand for reduction in accidents in mining;³ the safety appliance act of 1893 was the first attempt of the Federal government to deal with railroad accidents;¹ and the comprehensive report on accidents and accident prevention in the iron and steel industry was prepared in compliance with Senate Resolution No. 237 of June 23, 1910, and reported the activities of one company concerned with safety work since 1905.² In recent years, however, the safety movement has gained momentum and has attracted more general interest.

Without a background of the causes of accidents and methods for reducing them, the early efforts largely consisted, first, in installation of guards for machines and in making other engineering improvements; second, in inauguration of a program of education, which included meetings, posters, contests, awards, attractive signs,

* Numbers refer to bibliography at the end of the article.

and parades; and, finally, in preparation of safe practice standards and in personnel training, with a rather rigid adherence to both. The three respective steps may be classified as engineering, education, and enforcement — commonly referred to as the three E's of safety.

The impulse in industry to move forward in accident prevention was unquestionably related to the adoption of workmen's compensation laws, starting in 1911,¹⁶ for the reduction of accidents was found to result in lower premiums for compensation insurance. From the original efforts of a trial-and-error type, a rather systematic procedure has developed for the reduction of accidents. In recent years, attention has been called to the savings to be realized from the systematic approach to accident prevention; data on administrative costs of safety programs and savings in compensation payments are included herein.

The prevention of accidents is a humanitarian movement, from which both industry and employees have benefited. It has been found profitable to budget a reasonable amount for safety. The return on such an investment has included not only less time lost by employees because of accidents, but also more continuity of operation, better employer-employee relations, and lower insurance premiums. Compensation payments, including those for hospitalization and medical costs resulting from accidents, are referred to as "direct costs." These have been shown to be small compared with the "indirect costs"^{6, 12} discussed later.

Experience shows that an effective safety program must have its impetus from the top management.^{4, 11} With the active interest of executives, the program moves more smoothly and with less lost motion. An outstanding case of such interest is the American Rolling Mill Company, whose directors regularly review the company's record in accident prevention.¹⁴

The safety movement may be said to have come of age. The purpose of this article is to discuss briefly some common problems in accident prevention, to survey ways and means of accomplishing improvements, and to suggest a field for future efforts to consolidate further the gains that have been made.

For 1938, the total estimated cost of occupational injuries amounted to nearly three and a third billion dollars. This



Safety in the tunnel: wet drilling to reduce dust hazard, hard hats to withstand bumps

estimate includes direct and indirect costs. The June, 1939, *Survey of Current Business*, United States Department of Commerce, states that the national income for 1938 was sixty-four billion dollars. The economic waste from occupational injuries was therefore approximately 5 per cent of the national income for 1938. Human suffering that follows a fatality or serious disability cannot be evaluated in dollars and cents.

The National Safety Council has estimated that the direct costs due to accidents in occupational activities for 1938 were \$650,000,000. This estimate includes compensation and insurance administration costs, hospitalization, and medical costs. With a total of 16,500 fatal injuries and 1,350,000 nonfatal injuries for 1938, the direct cost per injured employee was \$475 for that year.

Significant as the direct costs of injuries are, they are believed to be only one-fifth of the total cost. Indirect, or hidden, costs are generally believed to be four times the direct cost. The computation of indirect costs¹² was based upon a careful analysis of about 10,000 actual cases by H. W. Heinrich of the Travelers Insurance Company. These indirect costs include the cost of time lost by injured employees; cost of time lost by other employees; cost of time used by executives and others for investigations, preparation of reports, and correspondence; damage to property; and other items. Numerous examples have been published to substantiate the 4 to 1 ratio.¹² It is not difficult, however, to visualize damage to equipment or structures that exceeds the 4 to 1 ratio. An unsafe act in hazardous surroundings — near flammable vapor mixtures, for example — may cause an explosion in which the employee may or may not be injured but from which destruction of the building and its contents may result in heavy financial property loss and interruption to normal operation of the plant, with consequent loss of business as well.



Safety programs and safety education must reckon with protection against fire as well as prevention of accidents.

TABLE 1: ADMINISTRATIVE COSTS OF SAFETY PROGRAMS FOR 1938, AND COMPENSATION PAYMENTS FOR 1938 COMPARED WITH PAYMENTS IN YEAR PRIOR TO SAFETY PROGRAM

Average Number of Employees 1938	Administrative Cost of Safety Program 1938	Cost per Employee 1938	Compensation cost for Year Preceding Safety Program	Compensation Cost for 1938	Reduction in Compensation Cost	Percentage Reduction in Compensation Cost
1,316	\$12,000	\$9.04	\$ 85,000	\$17,506	\$67,494	79
2,427	11,840	4.88	44,432	15,908	28,524	64
2,860	16,000	5.59	60,877	35,289	25,588	42
5,576	25,000	4.48	100,440	68,370	32,070	32

Loss of time by employees because of accidents, reported by eighty industries, including 19,177 establishments,¹³ totaled 10,575,287 days in 1938. These establishments employed 3,693,000 persons. The average time lost through accidents was about 2.9 days for each worker employed during the year. Information is available¹³ which lists the experience for each of the eighty industries. The total figures are of interest, however, because they indicate a possible source for improving plant operation and efficiency by the reduction of loss of time. A comparison of the 1938 experience with that for 1937 shows improvement: The days lost for each worker employed in 20,167 establishments were about four in 1937.

It is generally understood that financial savings may be expected from sound safety programs, but specific costs and savings have not been common knowledge. Such data are of interest to executives. In Table 1 above, therefore, administrative costs and savings are shown.

Two of the four companies that furnished the information are public utilities, one is an oil company, and one is a steel company. The figures given in the table were furnished with the understanding that there would be no company identification. Three companies had more employees in 1938 than were on their pay rolls in the year prior to that in which their safety programs were initiated. Safety programs had been in effect twelve years for three companies and thirteen years for the fourth.

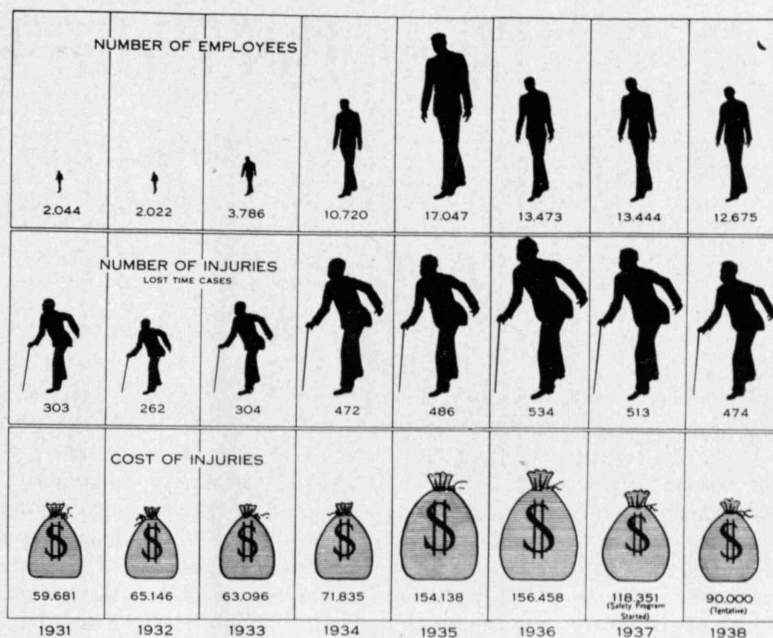
Table 1 shows the reduction in compensation payments for each company as substantially more than the administrative cost of the program. For one, the saving in excess of the administrative cost was more than 450 per cent, and the number of disabling injuries was reduced from 106 to 17. The importance to this company of uninterrupted operations, of reduction in time lost by injured employees, as well as of reduction in time required by executives for investigation and correspondence, is obvious although not easily shown in dollars and cents and not reflected in the savings shown in the table.

Variations in management policies relating to safety committee meetings, safety education — such as membership in the

National Safety Council — cost of improvements to correct defective conditions, awards and prizes, and the like made it impracticable to include such data in a tabulation. These costs are considered an added advantage as an investment in safety, and may contribute to improved operation and higher employee morale. Some companies report a substantial budget item for medical services in their general safety programs. Pre-employment and periodic physical examinations of employees are considered a contribution to physical fitness; they should not be used as a weeding-out process.

The bar chart, Table 2 below, presents the distribution of injuries by causes and is based upon the analysis of a five-year experience record of one organization. Two causes are conspicuous, namely, handling objects and falls of persons. It is of interest that results published by states on their industrial injury experiences show the same leading causes. The five-year experience of New York (1932-1936), covering 372,066 injuries, showed 29.3 per cent to have been caused by handling objects and 21.9 per cent to have resulted from falls of persons. Similar data for Pennsylvania for 1936 showed 23.8 per cent of a total of 108,036 disabling injuries and fatalities to have come from handling objects and 18.1 per cent from falls of persons. It is probable that a study of accidents in any given plant would show the same two predominant causes, although sometimes there might be variation because of hazards peculiar to an industry.¹⁷

The lifting of heavy objects which results in strains, including back strains and hernia, is worthy of note because it is the most prevalent cause of injury in the handling-objects classification. Faulty physical conditions, such as unsafe walkways, poor lighting, and slippery floors, contribute to falls of persons. There are



A safety program is a good investment, as this pictograph indicates. It shows the actual experience of one organization before and after introduction of such a program. Note the upward trend from 1931 to 1936 and the change to a downward trend after the program was instituted in 1937. The reduction in compensation costs from about \$156,000 in 1936 to \$90,000 in 1938 is significant.

also personal factors, such as lack of caution and inadequate attention, which may be important in falls on stairways and elsewhere. There is one fundamental that should be considered: In a design of a structure, the load is distributed over a large area by spread footings and in other ways. The weight of a human being, on the contrary, is supported on bearing surfaces (feet) of a small area. Any condition that throws the human being out of balance may result in a fall, particularly of the individual who does not have good co-ordination.

The following factors have been given as an accident-occurrence series: ancestry and social environment, fault of person, unsafe act or mechanical or physical hazard or both, accident, and injury.⁹ To illustrate the sequence Heinrich has used the following example: "Assume that an employee in a manufacturing plant receives a fractured skull as the result of a fall from a ladder. Investigation discloses that he descended the ladder with his back to it, in wilful disregard of instructions, and caught his heel on one of the upper rungs. The effort to train and instruct him and to supervise his work was not effective enough to control this fault. Further inquiry also indicated that his social environment was conducive to the forming of unsafe habits and that his family record was such as to justify the belief that reckless tendencies had been inherited." The train of circumstances in the example fits the pattern outlined in the accident sequence.

The following activities in a safety program have given excellent results and are adaptable to plants of moderate or large size, or to organizations having a number of plants of widely separated geographic locations. To obtain the best results, a preliminary study is strongly recommended to ascertain the causes and costs of accidents for several (Continued on page 204)

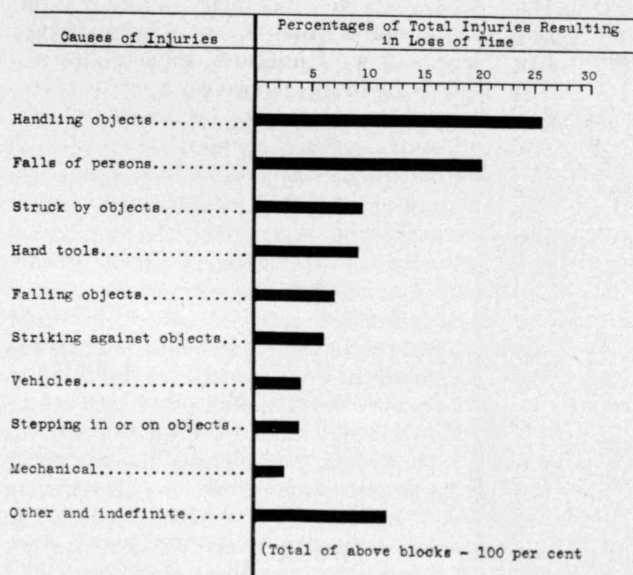


TABLE 2

They Beat the Clippers

Skill and Daring Counterbalanced Lack of Technical Knowledge And Shop Equipment as Early Marine Engine Builders Laid Foundations for Modern Marine Power

BY W. MACK ANGAS

WHEN contemplating the marvels of modern marine power plants and admiring the skill of the engineers responsible for their efficiency, one is likely to dismiss the machinery of pioneer steamers as the crude product of designers and engine builders who displayed a woeful lack of engineering knowledge. It is of course true that the engines of the first steamers were crude, clumsy, and inefficient if judged by the standards of today, but for all that, the men who designed, built, and ran them deserve an honored place in the annals of engineering. Their ingenuity and daring have rarely been equaled if ever surpassed. With but little knowledge of the fundamental physical laws underlying the principles of the steam engine, and with machine tools of the simplest kind, the engine builders of the first decades of the Nineteenth Century developed from the machinery of Fulton's *Clermont* the power plants which enabled the steamship to defeat the clipper ship as a fast ocean carrier. They also laid the foundation upon which technically trained engineers later developed the efficient marine power plants that enabled the steamer almost completely to supersede the sailing ship.

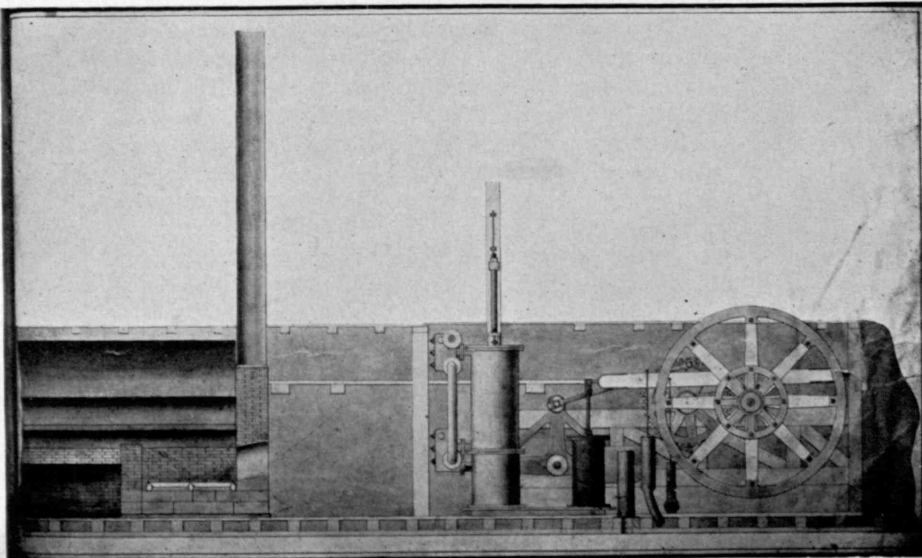
Despite a recent tendency to belittle the work of Fulton, the fact is that his *Clermont* was the first steamer to carry out the mission for which she was built. It is true that a number of experimental steamers were built before the *Clermont* and that at least one of them had been put into commercial service, but the *Clermont* initiated the era of the steamboat as a practical vessel. Fulton made no mistake in purchasing the engine for his boat from the excellent firm of Boulton and Watt.

Photograph of one of Fulton's drawings of the Clermont's machinery. A link from the crosshead actuated the big bell crank at each side of the cylinder. From the upper arms of the cranks, connecting rods ran to crankpins set in the faces of gear wheels on the inboard ends of the port and starboard paddle shafts. These gears meshed with two gears mounted on the flywheel shaft.

The firm had come into existence in 1775, when Matthew Boulton, a successful Birmingham manufacturer, took into partnership James Watt, a Scottish engineer then in his fortieth year, who had demonstrated outstanding ability but had been unable to secure satisfactory financial backing for the development of his ideas for improving the steam engine. The men were friends when the partnership was formed and remained so throughout a long and profitable association to which Watt brought unrivaled professional skill and ingenuity, and Boulton, a rare knowledge of business and manufacturing. In the year 1800, five years before their firm built the *Clermont's* engine, both Boulton and Watt retired from active participation in the business and turned its management over to their sons.

In the twenty-five years of their active association, the partners had built literally hundreds of successful pumping and mill engines, the typical Watt engine of the close of this period being a single-cylinder, double-acting, jet-condensing beam engine using steam from a flue boiler at a pressure of from seven to ten pounds a square inch. The cylinders of Watt's later engines were machined in a boring mill invented by George Wright, one of his assistants, and not merely worked smooth with abrasives as in earlier engines; but the piston ring had not been invented and in its stead was used a packing of hemp or soft rope lubricated with tallow. Early in his career, Watt had become aware of the seriousness of the condensation losses which occurred in the cylinders of his engines and sought to minimize them by the use of the steam jacket, on which he obtained a patent. Later he invented the indicator which enabled him to study the expansion of steam in a cylinder and determine the power it produced. He had also learned to use steam expansively by arranging the admission valves of his engines to cut off at part stroke. Before he retired, Watt had experimented with a surface condenser and even a rotary engine but had steadfastly refused to have anything to do with the introduction of high steam pressures, which he condemned as dangerous. Considering the materials and standards of workmanship then prevailing, he was probably justified in this opposition to a development destined at a later date to be generally accepted.

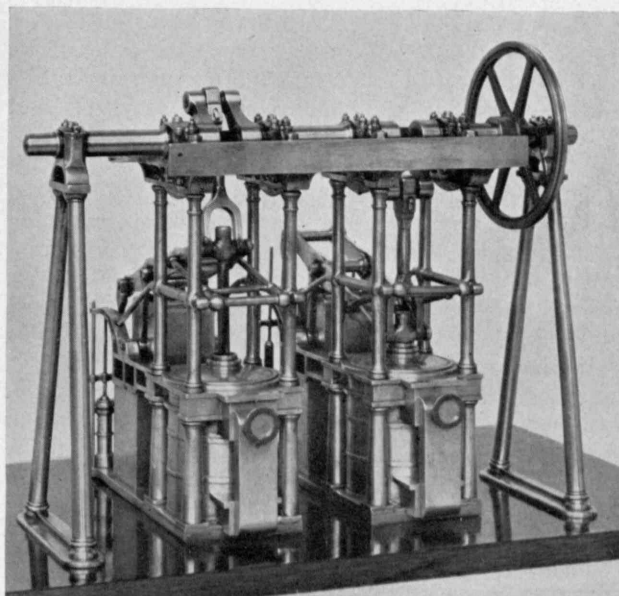
(192)



William H. Broadwell

All this might be summed up by saying that when Fulton went to Boulton and Watt for a steamboat engine in 1805, the firm was beyond all question the leading builder of steam engines in the world. Furthermore, the firm had furnished the machinery for the *Charlotte Dundas*, a stern-wheel tug built by William Symington for service in Scottish canals. Fulton is said to have visited Symington in 1801 or 1802 and to have made an eight-mile trip up the Forth and Clyde Canal on his steam tug, the power plant of which was singularly like that of a modern stern-wheel steamer in general arrangement. At any rate, Fulton was no doubt aware that the little steamer was withdrawn from service because of fear that her wake would do excessive damage to canal banks and not because her engine failed to drive her in a satisfactory way. The engine which Fulton ordered for the *Clermont* was not a copy of the direct-acting horizontal engine of Symington's boat; in fact, its somewhat peculiar arrangement has been criticized as a retrograde step from that of the engine of the *Charlotte Dundas*.

Actually, the *Clermont's* engine was a much better machine for the conditions under which it was to operate, its great point of superiority being its vertical cylinder which minimized friction of the piston and its packing on the cylinder wall. A photograph of one of Fulton's drawings of the machinery of the *Clermont* is reproduced on page 192 and shows the general arrangement of the engine. The double-acting cylinder of 24-inch bore and 48-inch stroke was mounted above the jet condenser into which it exhausted, the piston rod protruding from a stuffing box at the top and terminating in a wide crosshead running on guides mounted on a wood gallow's frame. Links from the ends of the crosshead dropped to and engaged the horizontal arms of two large bell cranks, one at each side of the cylinder, and from the vertical arms of these bell cranks, connecting rods ran to crankpins set in the inboard faces of two gear wheels mounted on the inboard ends of the shafts of the port and starboard paddle wheels. The teeth of these combination gear wheels and disk cranks meshed with the teeth of two smaller gears mounted on a shaft parallel to the paddle shafts and forward of them. This shaft carried a heavy flywheel and thus served to keep the engine running smoothly as well as to keep the cranks of the port and starboard paddle wheels in phase with one another. Forward projections on the horizontal arms of the bell cranks formed counterweights to balance the piston, crosshead, and side links and also served as points of attachment for levers actuating the air pump, boiler feed pump, and bilge pump. Valves were of the poppet type and were operated mechanically by gear not shown on the drawing. Steam at about seven pounds' pressure was furnished by an elliptical copper boiler 20 feet long, 7 feet deep, and 8 feet wide, which rested on a brick setting. The entire plant was crude, but it ran well enough to demonstrate the practicability of the river steamer as a commercial carrier, the *Clermont* making her first trial run up the Hudson in 1807 and going into service between New York and Albany the following year. By 1812, Fulton and his associates, to whom the New York legislature granted a monopoly for the operation of



In the Science Museum at South Kensington, England, is this model of the two-cylinder paddle engine of H.M.S. Gorgon, 1837. Obvious is its similarity to the modern "inverted" engine, which is practically the Gorgon engine turned upside down.

steam vessels on the inland waters of the state, were running six steamers in the vicinity of New York — among them the *Clermont*, which had been extensively improved and renamed *North River*.

Fulton's fame should rest on the fact that he built and operated the first commercially successful steamboats. As an inventor of marine engines he must yield place to Colonel John Stevens of Hoboken, who in 1804 built a twin-screw steam launch which made experimental runs on the Hudson, and who in 1807 completed the side-wheel steamer *Phoenix* shortly after the *Clermont* made her initial trip up the Hudson. The *Phoenix* was driven by an engine designed by her owner and built under his supervision. It appears to have driven the boat satisfactorily, but the monopoly granted to Fulton prevented Stevens from using the *Phoenix* in New York waters. Hence, after running her in the vicinity of New Brunswick for a short time, Stevens conceived the idea of taking her to Philadelphia for service on the Delaware River between that city and Trenton. The trip from Sandy Hook to the Delaware capes, the first ocean voyage ever undertaken by a steam vessel, was made in 1809. Though bad weather forced the *Phoenix* to take shelter in Barnegat Inlet on her way south, the little vessel reached the mouth of the Delaware safely, and ran between Philadelphia and Trenton for some time. *Phoenix* may be looked upon as the progenitor of the American river steamer, inasmuch as Robert L. Stevens, the son of her builder, had a lot to do with her construction and operation and later became one of the country's most successful marine engine and steamboat designers.

As the operation of steamboats became a paying business, first in America and then in Great Britain, the marine engine was steadily improved and developed into a more efficient, reliable, and practical machine. For some years the pace of its development appears to have

been set by the rate at which machine tools and machine-shop practice improved. Fulton and Stevens were undoubtedly capable of designing better marine engines than they ever actually built, but the shops of their time could not make and machine the necessary castings and forgings. Thus the peculiar arrangement of disk cranks connected by gearing adopted by both Fulton and Stevens was undoubtedly a device to overcome the inability of the shops of their day to forge and turn a satisfactory crankshaft, a piece of work that is today so simple it is difficult to realize that it was ever virtually impossible. Even Watt, working with an organization that had specialized for years in engine building, gave up attempts to machine satisfactory crosshead guides and adopted his highly ingenious parallel motion, a system of swinging links or levers each of which could be finished in a lathe, to keep the crossheads of his beam engines moving in a line that was approximately straight. But the steam engine, particularly the stationary engine then coming into wide use in the textile districts of Great Britain, was causing an unprecedented interest in the mechanic arts, and improved tools and methods invented for the production of textile machinery were soon available to marine-engine builders. Thus the planing machine for metals, developed in England about 1814 for planing the sides of looms and the beds of lathes, rendered practical the slide valve which had been invented years before by Watt's assistant, Murdoch. The result of all this was that within twenty years of the *Clermont's* trial trip, the steamboat had become commonplace as a river and coasting vessel in both America and Europe.

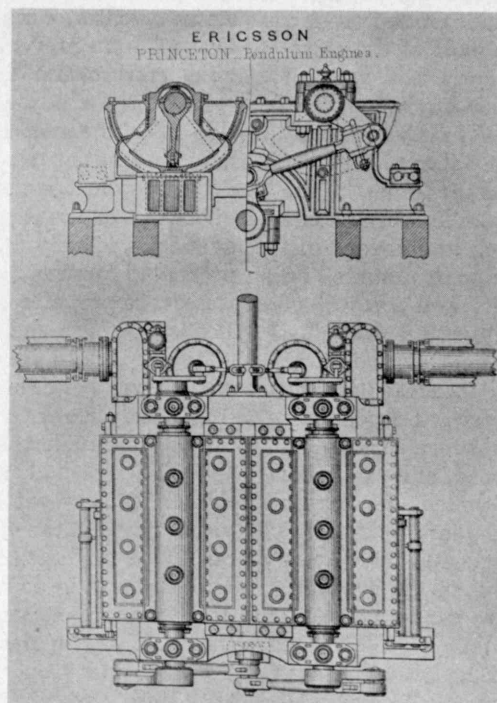
The development of the practical steamboat in Europe had commenced in 1812 with the construction on the Clyde of Bell's *Comet*. She was a much smaller boat than the *Clermont*, having a keel only forty-two feet long and a beam of eleven feet. Her Watt engine of three nominal horsepower was connected to her paddle wheels by means of a system of levers and gears not unlike that used by Fulton. She proved a seaworthy little vessel and with the combined power of her engine and a square sail and jib, which were hoisted on her stack as a mast, she made coasting voyages around the British Isles and did much to convince conservative Scottish and English shipowners that the steamer was worth developing. *Comet* was followed a year later by the similar *Elizabeth*, also built on the Clyde. The Scots of Glasgow and its vicinity appear to have taken at once to steamboat building, for in the year 1814 we hear of their turning out their seventh steamer, well

named *Industry*, and sending the *Argyle*, built the previous year, to London, where she was renamed *Thames*. Steam-engine building by this time had become well established in Scotland, and Scottish engine builders began to contribute important improvements to the development of the steam engine in general and the marine engine in particular. Among these improvements should be mentioned the metallic piston ring brought out by Murdock and Aiken of Glasgow in 1813. During this period David Napier started building marine engines on the Clyde.

This was a time when engine builders were experimenting with all sorts of devices for connecting the piston rods of their engines to the paddle shafts of their boats. Napier's invention of the side-lever paddle engine established him as one of the leading marine-engine builders of the Clyde if not of the British Isles. The engine resembled in many ways the one used by Fulton in the *Clermont*. The cylinder was placed in a vertical position with the piston rod coming out of the top and terminating in a wide crosshead guided by a parallel motion of the Watt type. From the ends of the crosshead, links dropped to a pair of big side beams or side levers mounted on bearings fixed to the engine bed midway between the cylinder and crankshaft. The ends of these levers opposite the cylinder were connected by a rod known as a crosstail, from which a connecting rod ran to the crank. At first built as a single-cylinder machine, the side-lever engine soon became immensely popular and was produced by many prominent engine builders such as Maudslay of London, Boulton and Watt of Birmingham, the Allaire Works and Novelty Iron Works of New York, and with outstanding success by Robert Napier, a cousin of David Napier, who started as a mechanic in his cousin's plant, later took over its management, and finally became one of the greatest ship and engine builders of Scotland.

As the size of steam-propelled vessels was increased, side-lever engines with two cylinders became common. Another of Napier's inventions, the steeple engine, became fairly popular in the United States but never seriously rivaled the beam engine. Other popular types of paddle engines were the Gorgon engine, a short-stroke direct-acting engine whose cylinder or cylinders were directly below the paddle shaft; and the oscillating engine which persists today in the form of the cheap toy steam engine. None of these machines, however, ever seriously rivaled the side-lever engine as the most popular power plant for ocean-going paddle boats.

(Continued on page 206)



Ericsson's pendulum engine, designed for the U.S.S. Princeton, in which it appears to have given fairly satisfactory service. Similarity of this unusual engine to an automobile windshield-wiper motor is noticeable. This sketch is reproduced from Bourne's Treatise on the Screw Propeller.

Harness for Apollo's Horses

*Under the Cabot Fund, Institute Researchers Are Seeking
More Direct Ways of Converting the Sun's
Energy into Useful Power*

BY HOYT C. HOTTEL

ALMOST every chemist or physicist is, in the large sense, working on the problem of converting the energy of the sun, for the sun is the source of all energy, and almost any problem in chemistry or physics is related in one way or another to the conversion of energy from one form to another. To the Institute, however, conversion of solar energy has a specialized meaning, in the light of the investigation made possible by the gift of \$650,000 from Godfrey L. Cabot, '81. Made in 1938, this donation had as its purposes examination of the possibilities in present direct use of solar energy, and research designed to aid in making such direct use economically feasible.

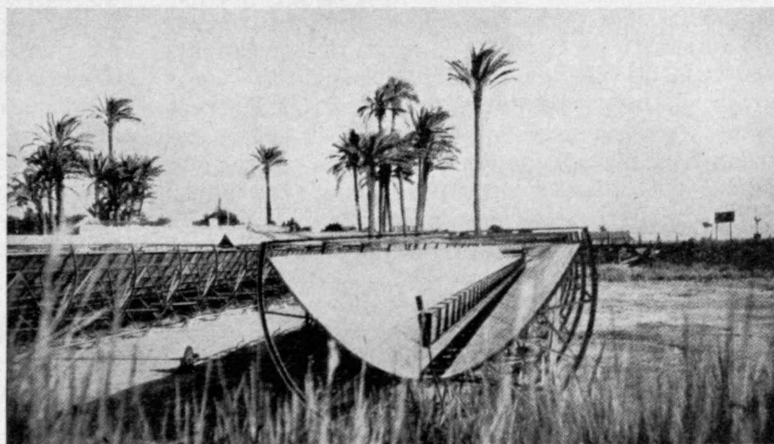
All sorts of ways of putting the sun to work have been speculated on by both the ingenious and the ingenuous in the years since men became interested in engineering. In an institution such as Technology, where a harmonious balance is maintained between the point of view of the scientist and that of the engineer, two general ways of approach to this ancient ambition are possible. The scientist, in thinking about how to convert solar energy into useful power, will look to long-range programs studying fundamental phenomena without regard to immediate application. The engineer would not deserve his title if he overlooked the study of what at the moment appears to be the method most promising of practical results. Both points of view are recognized in the Institute work now going on; problems of both types have been undertaken. One group includes investigations whose motive is not so much the prospect of early applicability to useful conversion of solar energy as it is the belief that the projects may be fitted properly into the Institute's basic research program, that they will certainly yield results of scientific value, and that they may possibly give practical importance to methods of solar energy conversion which now are of only scientific interest. The other group includes problems chosen because they relate to a method of solar energy conversion which an engineer would employ if he had to build a conversion plant at once. Of the four projects now under way, two fall in the scientific category, one may be classed either way, and the fourth is an engineering problem.

Photochemical and photoelectric means of conversion of solar energy are being investigated in the two primarily scientific projects. Both of these seek to exploit

that portion of the sun's energy which reaches the earth in the form of light. The third project is a study of the possibilities of using the so-called thermoelectric effect at metal junctions to turn into electricity part of the sun's energy which comes to us as heat. The fourth project, direct conversion of solar energy into heat and utilization of that heat in more or less conventional ways, may be regarded as a strictly engineering undertaking.

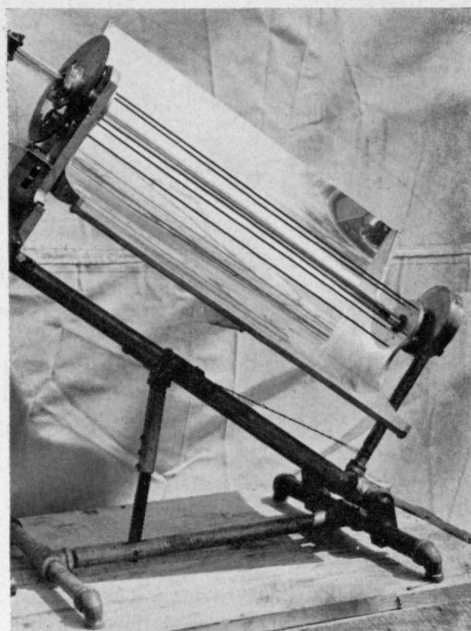
The most important chemical process on the face of the earth — going on all the time in an undiscovered fashion and supplying all living beings with the wherewithal that keeps them alive — is the process known as photosynthesis, by which the chlorophyll of green plants absorbs light energy and transfers it to the chemical system of carbon dioxide and water within the structure of the plant, which in turn utilizes it for building up carbohydrates that will be consumed by animals. The mechanism of this process of photosynthesis is an intricate and baffling problem; all attempts to imitate it outside the living cell have so far ended in failure. At present it stands, however, as a model for emulation in the Institute's search for photochemical means of converting solar energy into useful power, since the study of ways by which light energy can be transferred from chlorophyll and similar "sensitizing" substances — not necessarily to carbon dioxide and water — to other chemical systems appears to be the best approach to the problem of conversion.

In seeking thus to simulate or to better nature's performance in photosynthesis, one can either follow nature as closely as possible by trying to use the light energy to



Smithsonian Institution

A section of the Shuman solar energy absorber in Egypt, 1912. Five such reflectors, 205 feet long, were used to produce steam.



Reflector type used in recent experiments of Charles G. Abbot, '94, of the Smithsonian Institution

build up stable chemical compounds with a high content in energy (compounds which can be used later as fuel or explosives), or one can concentrate on the unstable short-lived compounds often produced directly in certain simpler photochemical processes, and try, for instance, to convert as much as possible of their excess energy into electrical energy.

So far, studies in the Research Laboratory of Physical Chemistry at the Institute have followed this second way. If we have a beaker containing a water solution of the organic dye thionine and an iron salt, and we arrange to illuminate one half of the beaker but keep the other half in the dark, a considerable difference in electric potential will be registered between electrodes immersed in the two halves. In this experiment, the thionine-iron system serves as a laboratory substitute for the chlorophyll and the carbon dioxide-water system of green plants. When illuminated, the purple thionine absorbs light energy and is reduced to the colorless leucothionine, with simultaneous oxidation of the iron from ferrous to ferric form. There is thus a shift in the chemical composition of the solution surrounding one of the electrodes. Illumination is followed by almost instantaneous bleaching, and return of color follows as quickly in the dark. Illumination increases the free energy of the system, so that it is in an unstable state of high energy, and its return to the stable state (colored, unilluminated) can be used to produce electric current.

How the thionine-iron system utilizes light to change its own chemical composition, and how this chemical change becomes reflected in a change in the electrode potential are the two questions with which experiments undertaken thus far are concerned. Although the system is a comparatively simple one, many variables must be dealt with in the determination both of the chemical composition of the illuminated solution, as shown by the degree of bleaching, and of the photogalvanic potential which the solution exhibits under different conditions of illumination. The potential has a sharp maximum at a certain concentration of the dye; decreasing acidity of the solution causes the bleaching to become weaker, but the photogalvanic effect, or electromotive force, to become stronger, with the paradoxical result that the strongest photogalvanic effects are observed in systems

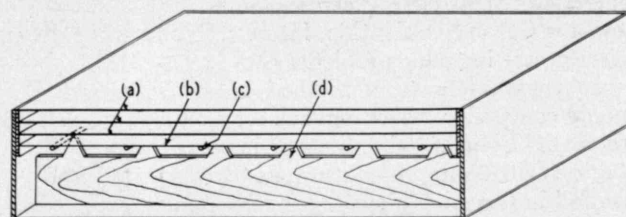
which are scarcely bleached at all. Intensity of illumination, too, is found to have a much stronger effect on potential in the less acid solutions.

Suggestions of the most satisfactory conditions for obtaining high photogalvanic effects have been secured from these measurements, and a theoretical understanding of the phenomenon has been in part provided by them. In the next stage of the research, the production of power, as distinguished from electromotive force alone, is to be investigated on the basis of present understanding of the way in which electromotive force is produced by light in cells with an open external circuit.

Whether photogalvanic cells of this kind will be found of direct usefulness in the problem of utilization of solar energy is a question not yet answerable. They certainly are of importance as examples of a photogalvanic phenomenon which has never previously been investigated under such favorable and controlled conditions. They permit valuable insight into the way in which sensitizing dyestuffs transfer their energy to other simple chemical systems. Photocatalytic action of this kind is not only the basis of natural photosynthesis but is probably also the only possible basis for further attempts to convert light energy into other useful forms of energy by means of photochemical processes.

The leaf of a green plant may seem rather remote to serve as analogy to a sandwich constructed of layers of metal and insulating material; yet the two are akin to each other in that both the leaf and the sandwich — a blocking-layer photocell, so called — convert into something else the energy which falls upon them in the form of light. Hence, the blocking-layer photocell is being studied by Institute researchers seeking means of converting solar energy into useful power. Of the various photoelectric devices known today, these barrier-layer cells, which exploit the unusual properties of cuprous oxide or of selenium, are the only ones showing promise of being developable into economical converting devices.

Though the efficiency of the blocking-layer cells is at present very low — of the order of half of 1 per cent — there is some compensation in the fact that their construction is very simple and cheap. How far their efficiency may be increased cannot be foreseen as yet, because their working mechanism is not fully understood. Essentially, the cells consist of a sequence of materials: a conductor; a semiconductor of graded characteristics, a portion of which, poorly conducting, is the so-called blocking layer; and another conductor. Light falling on the semiconductor — selenium (*Continued on page 212*)



Byron B. Woertz, '39

Cutaway view near the end of a simple flat-plate collector now being studied at Technology: (a) glass panes; (b) blackened sheet-metal absorber of solar radiation; (c) tubes for circulating fluid, in metallic contact with the sheet metal; (d) wooden support, spaced at intervals. Space between metal and bottom of container is filled with insulating material.

The Graduate School of M.I.T.

Progress in Enrollment, Requirements, and Facilities Has Been Notable Since Formal Organization Was Effected

By HARRY M. GOODWIN

ORGANIZATION of the Graduate School as an administrative unit was effected shortly after Dr. Compton became president of the Institute in 1932. Since then, as suggested in the first part of this survey of the growth of advanced study at Technology, progress has been continuous and notable not only in number of students seeking admission under increasingly higher requirements but particularly in the exceptional facilities provided for research. A recent survey of the various projects at present being carried out in all Departments placed the number at 529. Many of these are financed by contributions from the Research Associates and by grants-in-aid from various foundations which recognize that funds contributed for research at the Institute are productive of results.

Indicative of the recognition which graduate work has attained at Technology was the election of the Institute in 1934 to membership in the Association of American Universities, founded in 1900 by the presidents of the fourteen leading universities of the country at that time. Admission is "limited to those institutions qualified to carry on distinguished graduate work in a number of fields." At the annual meeting of the association held at the University of Missouri last November, the Institute was elected president of the Association for the year 1939-1940.

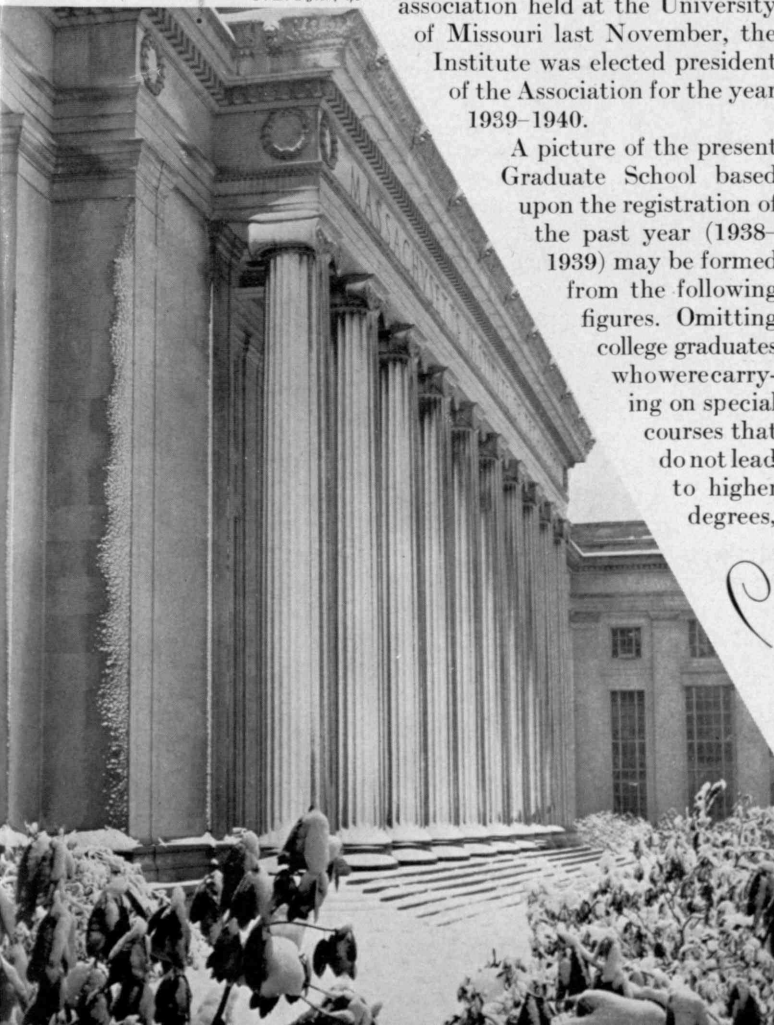
A picture of the present Graduate School based upon the registration of the past year (1938-1939) may be formed from the following figures. Omitting college graduates who were carrying on special courses that do not lead to higher degrees,

of whom there were sixty-seven that year, 692 were registered, or 22 per cent of all students in the Institute. Of these, 260 were working for the doctor's degree, 348 for the master of science degree, and seventeen for the degree of master in Architecture or master in City Planning. Over 75 per cent were graduates of 220 colleges other than M.I.T., located in forty-seven states, the District of Columbia, Puerto Rico, and twenty-five foreign countries. Seventy-eight foreign students were included, an indication of the international character of the graduate student body. Considering the distribution of students by Schools, we find 29 per cent were majoring in science, 68 per cent in engineering, and 3 per cent in architecture. Forty-two per cent were working for the doctorate, of whom 25 per cent were in the science departments and 17 per cent in the engineering departments.

On the other hand, among the 58 per cent studying for the master's degree, only 6 per cent were majoring in science while 52 per cent were in engineering. The reason why so many more students return for the master's degree in engineering rather than in science is the fact, now clearly recognized, that advanced specialization in any engineering field is impossible in a four-year curriculum. The Faculty has long ago ceased trying to crowd into four years the more advanced aspects of any branch of engineering or science. Moreover, the popular co-operative five-year engineering courses and the graduate courses for the army and navy students all lead to the master's degree. In the sciences, on the other hand, the doctor's degree is now regarded almost a necessity for those intending to follow an academic career or to enter many industrial research laboratories.

The question has not infrequently been asked whether the Institute is not destined to become wholly a graduate school. This may definitely be answered in the negative. The great body of students will continue to be undergraduates taking curricula leading to the bachelor's degree. A limit can already be seen to the number of students who will be admitted to the Graduate School. The Committee on Stabilization, which has limited the entering freshman class to 600, has already been obliged to place quotas on the number of graduate students who may be admitted to several Departments. Thus quotas are now assigned in the Departments of Physics, Chemistry, Chemical Engineering, Biology, Electrical Engineering, and Aeronautical Engineering. Some of these Departments already have waiting lists. The policy has been adopted of admitting to any Department only as many graduate students as the Department can adequately provide for with its staff and research facilities.

J. E. Tyler, '40



The selection of the most outstanding students for scholarship aid from the hundreds who apply is one of the most difficult problems which are presented to the Committee on the Graduate School annually. Some idea of its magnitude may be gathered from the fact that last year 615 applications, with accompanying credentials and letters, were received prior to March 1. The budget, however, permitted only 236 awards; hence 118 additional applicants highly recommended by department committees had to be placed on the waiting list. The Institute has been liberal in its appropriations to meet the ever increasing needs of its graduate students. The Technology Loan Fund has also been made available to these men. During the depression, eighty half-tuition scholarships amounting to \$20,000 were voted from general Institute funds to assist needy students, and since the tuition was increased from \$500 to \$600 in 1938, an appropriation amounting to 20 per cent of the income from endowed funds available for graduate scholarships has been made in order that the number of full-tuition scholarships shall not be reduced. Annual appropriations to meet the tuition of teaching fellows and assistants who are working for higher degrees are also provided by the Institute. Last year, 29 per cent of all graduate students were in this group. The total budget for graduate scholarships and fellowships in 1938-1939 was \$116,440 as contrasted with \$5,100 in 1909; \$8,000 in 1919; \$63,110 in 1929. The Institute, in seeking exceptionally brilliant students, has to meet keen competition from the graduate schools of other institutions which offer fellowships carrying much greater financial inducements than do ours because of their lower tuition. At present, we have only a few fellowships carrying stipends of \$1,000 or over, of which \$600 must be paid for tuition. More of these are much needed to help finance outstanding students who are working for the doctorate, particularly in their last year. The two Arthur D. Little ['85] Memorial Fellowships are of this character, but they are limited to students in Chemistry and Chemical Engineering. It would be a very fine thing if similar endowed fellowships were available in all Departments.

No account of the Graduate School would be complete without reference to the provision which has been made for the housing and the social life of the students. Although the desirability of providing a dormitory for graduate students was long recognized, it was not until 1933 when, because of the depression, many rooms in the undergraduate dormitories were vacant, that it was decided to convert three of the houses adjacent to the President's residence, and accommodating seventy-eight students, into a graduate house. These were completely refurnished and a lounge, library, and buttery were provided for social purposes. The house was placed in charge of a resident housemaster, Avery A. Ashdown, '24, Assistant Professor of Chemistry, whose enthusiasm for the undertaking, wise counsel, and tact have contributed much to the success of the plan. After a year's trial, when there was a long waiting list of students anxious to obtain rooms, it was decided to convert into a graduate house the whole so-called faculty dormitory group, accommodating 206 students. Then for the first time a substantial number of our graduate students

had an opportunity to become acquainted. Social contacts were further encouraged by a weekly dinner when the students met together with some distinguished guest who gave them a short after-dinner talk, and by Sunday afternoon teas when the students and their friends had an opportunity to meet informally with faculty members and their wives, and other guests.

In 1937 the Institute was able to acquire Riverbank Court, the large apartment hotel at the corner of Massachusetts Avenue and Memorial Drive. The arrangement of suites in this building proved almost ideal for conversion into a student dormitory. Thanks to the untiring efforts of Horace S. Ford, Treasurer of the Institute, and Dr. Ashdown, during the spring and summer of 1938 this building was modernized, redecorated, and furnished so that it was ready for occupancy by September.

This new Graduate House accommodates nearly 400 students and is filled to capacity — with a waiting list. Not only have the students a lounge, reading room, library, clubroom, buttery, and game rooms, but they also have their own dining room, a feature which was not possible in the former Graduate House. There still remains the problem of providing living accommodations for married students, of whom there are now a considerable number. A step in this direction has already been made as the Institute has recently acquired Bexley Hall, a housekeeping apartment building of forty-eight suites located directly opposite the Institute on Massachusetts Avenue.

In conclusion, it should be pointed out that the great increase in the enrollment of graduate students during the past ten or fifteen years is not peculiar to the Institute. It is a development in American education which is taking place in all universities and technical schools of the country. Education beyond the level of the bachelor's degree is becoming recognized as a requirement for teachers in secondary schools, while institutions of higher learning and many industrial research laboratories now regard the doctor's degree, if not as absolutely essential, at least as highly desirable for members of their staffs.

From the foregoing account of the Graduate School its growth may be seen to have paralleled very closely the provision which has been made for research not only from the standpoint of superior laboratory facilities but also from that of a distinguished research staff. Both are necessarily expensive and make the cost of graduate instruction high. No one will question, however, that appropriations for graduate work have been fully justified by the reputation which the Graduate School enjoys today. It may well be doubted that President Rogers ever envisaged a Technology with 3,000 students of whom over 650 are working for the doctor's or master's degree; but to provide the opportunity for pursuing advanced study and research was clearly a part of his original plan for the Institute. So long as the Graduate School enjoys the enthusiastic and splendid support given it by President Compton, it is bound to play a role of increasing importance not only in training men for leadership but also in advancing knowledge through the research activities carried on by its students and staff.

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

Fellows of Industry

THE third nation-wide competition for at least ten fellowships open to mature young business executives and covering twelve months of advanced study and investigation at the Institute in the fields of business administration and economics, is now in progress. The recipients of these fellowships will undertake a special one-year program of work aimed further to prepare for ultimate positions of higher administrative responsibility young executives of seasoned intellectual capacity, proved managerial ability, and demonstrated sensitiveness to the social and civic implications of industry. The program is made possible largely through a renewed grant of \$32,500 from the Alfred P. Sloan Foundation. It meets the foundation's stated objective of "the increase and diffusion of economic knowledge" by emphasis upon the broader economic and social aspects and responsibilities of industry. By such emphasis it is hoped to return the recipients to industry better equipped to meet present-day industrial problems and their duties as individuals and citizens.

The grant permits stipends as high as \$2,500 for married recipients. These bring the opportunity within the range of all who are competent to benefit from it, whether they be employed by large or by small companies, and wherever they may be located. The wide geographic and industrial diversification which characterizes the present group is in itself a source of educational strength.

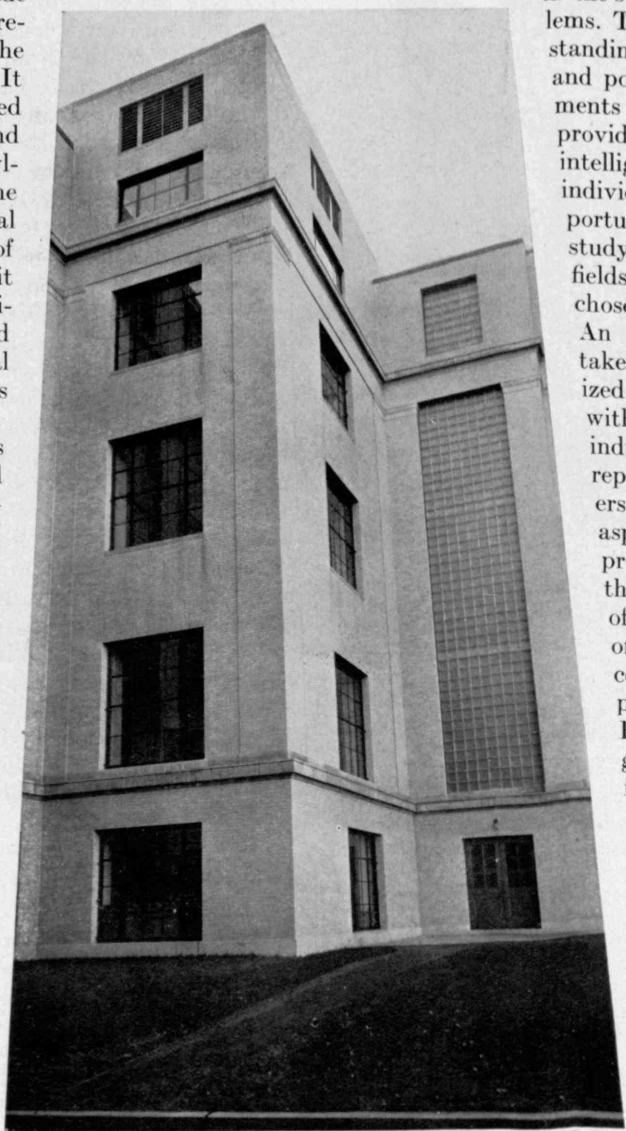
In announcing the new competition, which will close on March 16, Professor Wyman P. Fiske, director of the program, said that the work to be undertaken by the fellows has been designed to capitalize their maturity and experience and to offer a quality of value not otherwise readily obtainable by the young executive in industry. The

entire program places continuing emphasis upon the forward-looking responsibilities of industry to society. External influences bearing on industrial administration are likewise kept constantly in view. Effort is made to define the responsibilities borne by industry in our economic and social activities and the effects of industrial operations upon other parts of the structure. This is accomplished not only by allotment of a substantial part of the study time to current problems and trends in such areas as labor relations and legislation, governmental relationships to industry, domestic and international economics, sociological developments, and social psychology, but by attention to these problems in the study of specific business problems. The aim is to give an understanding of the varying objectives and points of view of different elements in our society and so to provide a basis for enlightened and intelligent administration of the individual business enterprise. Opportunity is provided for advanced study in a variety of professional fields and for concentration in a chosen specialty.

An important activity undertaken by all fellows is an organized series of evening conferences with approximately forty leading industrial executives, government representatives, and labor leaders. During the series, various aspects of the administrative problem are considered and there are presented the point of view and approach of one or more men intimately concerned with its solution in a practical form.

Recipients undertake the program upon a leave of absence from present employment. Selection is upon the basis not only of certain minimum requirements but also of evidence of ability and opportunity to benefit from the special nature of the program. Final award is made only after interviews with a selected group.

Applicants should be between the ages of twenty-seven and thirty-three and should have had a minimum of five years' indus-



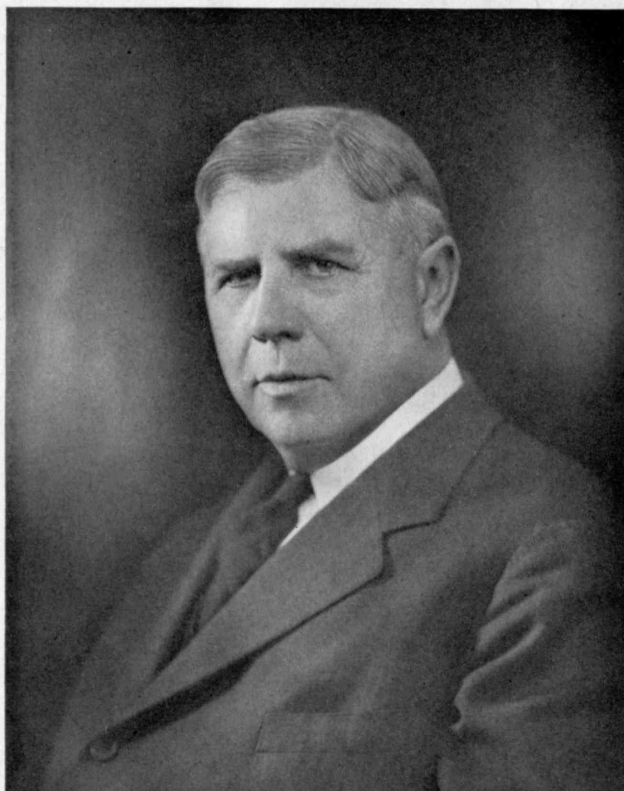
M.I.T. Photo

Photographic interest is not confined to the Institute's street face, as witness this view of a rear corner of the new Rogers Building.

trial experience subsequent to completion of their academic education. At least a portion of such experience must have been in positions of a managerial type and in executive activities which promise further progress toward administrative responsibilities. The academic background must have been in either science or engineering and should reflect an ability to profit by graduate study.

Ballots on the Way

REPRESENTATIVES of the more than thirty thousand Alumni of the Institute are to be selected in the annual balloting of the Alumni Association during the next few weeks. Ballots are in the mails to the electorate, presenting the slate prepared by the National Nominating Committee of the Association, which comprises Ernest B. MacNaughton, '02; Redfield Proctor,



FOR PRESIDENT

Bachrach

... of the Alumni Association, Henry E. Worcester, '97, is nominated by the National Nominating Committee of the Association. Life member of the Institute Corporation since 1937, he was a term member for five years before that. For nearly a quarter-century, athletes have benefited by his aid and counsel through his energetic and patient membership in the Alumni Advisory Council on Athletics since 1916. He entered the employ of Arbuckle Brothers, sugar refiners, after leaving the Institute, and after ten years with them became superintendent of the Revere Sugar Refinery in Cambridge. Becoming vice-president of the Revere organization in 1920, he served nine years, and since 1929 has been vice-president of the United Fruit Company. Mr. Worcester is a member of the American Society of Mechanical Engineers, is president of the Winchester, Mass., Hospital in his home town, vice-president of the East Cambridge Savings Bank, and member of various clubs, including the Union, Engineers, and University in Boston, and the Union League in New York.

'02; Edward L. Moreland, '07, chairman; George M. Gadsby, '09; Frederick W. Barker, '12; Walter J. Beadle, '17; Alfred W. Hough, '19; Alfred T. Glassett, '20; William J. Sherry, '21; and Franklin Fricker, '25.

The nominees are: *President of the Alumni Association*: Henry E. Worcester, '97, II, United Fruit Company, Boston, Mass. *Vice-President*: John E. Burchard, '23, IV, Bemis Foundation, M.I.T., Cambridge, Mass. *Executive Committee*: Francis A. Barrett, '24, VI, New England Telephone and Telegraph Company, Boston, Mass.; N. McL. Sage, '13, I, Placement Bureau, M.I.T., Cambridge, Mass.

In addition to naming candidates for the foregoing Alumni Association offices, the National Nominating Committee selects nominees for term membership on the governing body of the Institute itself — the Corporation. For the three vacancies, this year's candidates are: Page E. Golsan, '12, VI, Ford, Bacon and Davis, Inc., New York, N. Y.; Egbert C. Hadley, '14, VI, Remington Arms Company, Inc., Bridgeport, Conn.; and Alfred H. Schoellkopf, '15, VI, Niagara Hudson Power Corporation, New York, N. Y.

Members of the Nominating Committee itself are elected by districts, to terms staggered so that a third of the Committee goes out of office each year. Messrs. Moreland, Proctor, Barker, and Glassett will retire from the Committee on April 14, and so for the districts which they represent, Districts 1, 2, 4, and 5 respectively, these nominees for their posts have been selected, from whom Alumni will elect one for each district: *District 1*: Stanley G. H. Fitch, '00, X, Patterson, Teele and Dennis, Boston, Mass.; Charles R. Main, '09, II, Charles T. Main, Inc., Boston, Mass.; Harold S. Wilkins, '14, XIV, General Radio Company, Cambridge, Mass.; *District 2*: Andrew B. Sherman, '06, VI, D. M. Dillon Steam Boiler Works, Fitchburg, Mass.; Stanley W. Hyde, '17, VII, North Yarmouth Academy, Yarmouth, Maine; Albert R. Pierce, Jr., '31, XV, Pierce Brothers, Ltd., New Bedford, Mass.; *District 4*: Burt R. Rickards, '99, V, New York State Health Department, Albany, N. Y.; Kenneth M. Cunningham, '22, II, Eastman Kodak Company, Rochester, N. Y.; Whitworth Ferguson, '22, VI, Ferguson Electric Construction Company, Buffalo, N. Y.; *District 5*: Charles P. Fiske, '14, II, General Motors Acceptance Corporation, New York, N. Y.; James M. Ralston, '16, II, New Jersey Manufacturers Casualty Insurance Company, Trenton, N. J.; Winfield I. McNeill, '17, XV, Colgate-Palmolive-Peet Company, Jersey City, N. J.

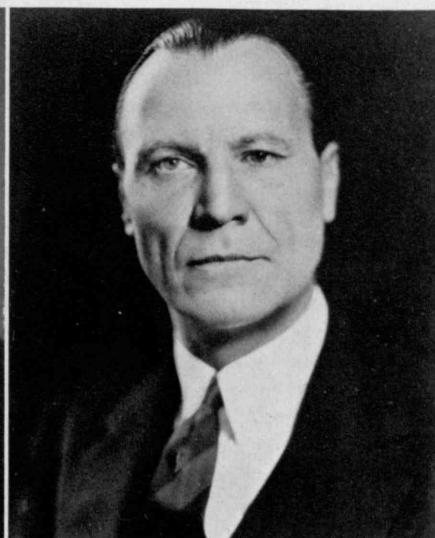
Noble Prize

CLAUDE E. SHANNON, a graduate student in the Department of Mathematics, was chosen to receive this year's Noble Prize, awarded annually by five leading professional societies for an outstanding technical paper, in recognition of his "A Symbolic Analysis of Relay and Switching Circuits," which was published in the 1938 *Transactions* of the American Institute of Electrical Engineers.

Not to be confused with the Nobel Prizes, which honor the Scandinavian scientist, Alfred B. Nobel, the Noble Prize honors the late Alfred Noble, prominent American



Hadley



Kalden-Keystone



Austin

TO THE CORPORATION

... nominees for term membership selected by the National Nominating Committee of the Alumni Association are, from left to right, Egbert C. Hadley, '14, Assistant to the Director of Manufacture, Remington Arms Company, Inc., Bridgeport, Conn.; Alfred H. Schoellkopf, '15, President of the Niagara Hudson Power Corporation, New York City; and Page E. Golsan, '12, Vice-President of Ford, Bacon and Davis, Inc., engineers, New York City.

civil engineer who, among other achievements, had an important part in engineering the Panama Canal. First awarded in 1931, this distinguished prize, which carries a stipend of \$500, is given to a member not over thirty years old of one of five contributing societies on the basis of a technical paper published in an official publication of one of the societies. They are the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the Western Society of Engineers.

Shannon, whose home is in Gaylord, Mich., won his bachelor of science degree at the University of Michigan in 1936 and then came to the Institute as a research assistant on the staff of the differential analyzer in the Department of Electrical Engineering. As an adept operator of the analyzer, he became interested in the mathematical problems of its design and in the complex engineering problems submitted for solution. This interest was responsible for his subsequent transfer to the Department of Mathematics, where he is nearing the completion of studies leading to the degree of doctor of philosophy. One of his recent studies was a mathematical analysis of genetics, carried out in part at the Cold Spring Harbor station of the Carnegie Institution of Washington. He now holds the William Sumner Bolles Fellowship, one of the Institute's most valuable awards for graduate study.

Architectural Historians Invoked

ESTABLISHED in 1865, the Institute's School of Architecture will celebrate its seventy-fifth anniversary this year. Since the School was a pioneer in architectural education in this country, its formal curriculum being the first way other than apprenticeship to become available to aspirant architects, its history is essentially that of the development of stabilized education in

architecture in the United States. Hence, from both the point of view of the Institute's own past and that of American higher education in general, much interest attaches to plans now in process for the writing of a history of the School from the time of its inception to the present.

Since collaboration is the backbone of any history, members of the staff, past or present, Alumni, and friends of the School are being urged to send in any source material that they may have, in the form of letters, clippings, memoirs, or reminiscences. Anecdotes — no matter how trivial — are particularly desired, for they make the past alive. Material should be addressed to Mrs. A. H. Vignoles, Arthur Rotch Library of Architecture, M.I.T. It will be carefully handled and will be returned after having served its purpose.

Graphic Arts

A NEW course in the arts and materials of fine printing, which is designed to give students an understanding of graphic arts problems, an appreciation of fine printing, and the capacity to select and design appropriate printing matter, began at the Institute with the opening of the second term early in February. The course takes its place as one of numerous interesting general studies offered in the Division of Humanities, of which Robert G. Caldwell is dean. This Division, it will be recalled, includes the Departments of English and History, Economics and Social Science, and Modern Languages.

Planned as an elective study, the new course, which is known as "The Arts of the Book," is in charge of Professor Henry L. Seaver of the School of Architecture. Associated with him in the various fields of instruction are Dard Hunter, curator of the Institute's Paper Museum, which bears his name; Professor Arthur C. Hardy, '18, of the Department of Physics, an authority

Copy
street

on optics, color analysis, and modern printing inks; Professor John E. Burchard, '23, director of the Albert Farwell Bemis Foundation; James R. Killian, Jr., '26, chairman of the Board of Publications; and Frederick G. Fassett, Jr., editor of *The Review*.

Discussion of paper, one of the fundamental materials of printing, includes the study of parchment, vellum, and papyrus, and methods of making paper by hand and machine. The manual lettering instruments of printing are also to be treated, including the brush, reed, quill, and pen. There will also be a discussion of calligraphy and a study of medieval manuscripts and type forms. This will be followed by a survey of the mechanical lettering instruments, their invention and evolution; and discussion of the use of hand presses, fine printing, and typographical nomenclature. Students in this course will have an opportunity to utilize the facilities of the Dard Hunter Paper Museum, in which is displayed the great collection of handmade papers gathered by Dr. Hunter from all parts of the world.

The course covers the history of fine printing in the early centuries as well as modern printing in the United States. Printing as a design problem includes type faces, composition, the relation of illustration to text, and processes of illustration. Time is being devoted to photography and modern mechanisms and methods of printing, which include machinery and typesetting, photography and illustration, other photomechanical methods, and modernism in book design. The art of bookbinding is to be described, and there will be instruction in organization for printing, including preparation of the manuscript and a discussion of the responsibilities of the author and editor.

The opening of the new course came during an exhibition in the School of Architecture of the techniques of book illustration. Sponsored by the American Institute of Graphic Arts and brought to the Institute by the Friends of the M.I.T. Library, this admirable exhibition was devoted to the work of living American illustrators and the various steps in reproducing their work in different types of illustration.

Business, Ballots, Biology

AT its 210th meeting, in Walker on the last Monday of January, the Alumni Council, under the chairmanship of Raymond Stevens, '17, Vice-President of the Alumni Association, had the pleasure of listening to remarks by President Compton, disposed of several items of business including ballot returns and ballot plans, and enjoyed a four-man résumé of the varied teaching and research activities of the Institute's Department of Biology and Public Health.

Dr. Compton sketched for the Council some of the multifarious problems reaching the President's office, among them problems of public relations which at first thought seem remote from educational affairs, but which provide occasion for valuable co-operation with civic agencies. The Institute budget is current educational concern, he observed. In connection with the 150th anniversary of the United States Patent Office, the Association of American Manufacturers is signalizing the work of modern pioneers in business and inven-

tion — men whose contributions to progress have been outstanding. Local honors are to come to three members of the Institute staff, Dr. Compton said; they are all alumni: Alfred V. de Forest, '11, Professor of Mechanical Engineering; Arthur C. Hardy, '18, Professor of Optics and Photography; and Harold E. Edgerton, '27, Associate Professor of Electrical Measurements.

Approval of bylaw changes necessary to the inauguration of the Alumni Fund, voted in November, was ratified at this meeting. Charles E. Locke, '96, Secretary of the Alumni Association, reported dues payments as running well ahead of comparable figures for recent years, and collections of pledges to the gymnasium fund as showing an unusually high rate. A larger vote than usual was cast on the question of institution of an Alumni Fund, he reported; the yeas totaled 3,919 as against 184 nays and twenty-two defective ballots. Nominees for alumni offices, listed elsewhere in this issue, were announced. Francis A. Barrett, '24, chairman of Alumni Day, reported briefly on plans for the event, schedule for which will be similar to those of past years, including a symposium, exhibits, a luncheon, Class Day exercises, and the Alumni Dinner in the evening. The general subject — communication — will be considered from the social point of view.

Samuel C. Prescott, '94, Dean of Science and Head of the Department of Biology and Public Health, was introduced by Mr. Stevens. Master of ceremonies for the program of the evening, Dean Prescott outlined the history of his Department, from its inception in 1871 as a Department of Natural History, the offspring of one of the original Departments of the Institute — that of Science and Literature. Its growth in number of graduates, he said, has been especially large since 1900, with the greatest increase since 1920. Through the Department, the Institute was the first school in the world to take interest in public health, and offered the first real training in that field, as it did also in sanitary engineering. The Lawrence Experiment Station, established by the state department of health in 1887, was a great factor in developing work in this new line, and students at the Institute had the advantage of keeping closely in touch with the research there and gained much instruction thereby. Stressing the pioneering work and the wide range of activities of M.I.T. Alumni in the development of public health and other lines of work in the United States, Dean Prescott observed that the Department is now in pressing need of larger quarters and greater resources in order to render service in, and make fully available the possibilities of, the varied lines of training it offers. Three of these fields were then discussed by members of the staff directing them, the Dean presenting in turn Clair E. Turner, '17, Professor of Biology and Public Health; Bernard E. Proctor, '23, Associate Professor of Food Technology; and John W. M. Bunker, Professor of Biochemistry and Physiology, director of the Research Laboratories of Biology.

Professor Turner summarized the requirements of public health practice, the training of health officers, public health engineers, and similar workers, pointing out that these people have human lives in their hands, and that during the past twenty years they have constituted 60 per cent of the Department's registration. In

this field and in the field of health education, he said, the Institute has always had more opportunities for graduates than graduates to fill them. Industrial hygiene likewise offers much scope for useful activity, in which he urged that the Institute should have a share. The international scope of the work which the Institute has already done in these areas was stressed, as was the fact that the Department's health education studies have proved that education can better the habits of children sufficiently to improve their health as reflected in their rate of growth. Men and women trained in health education at the Institute are now in positions of leadership in this field in many parts of the world. Photographs of a bacterial barrage from a common sneeze stroboscopically caught in the act were shown, and in connection with them Professor Turner stressed again the opportunities and the needs for better health education in order to cut down the incidence of disease spread in such ways.

Explaining the work of the food technologist, Professor Proctor discussed the curriculum by which the Department prepares students for work in the development of new products and processes, the selection of proper raw materials, the understanding and control of changes in the composition and physical condition of foodstuffs in their industrial processing, the technical problems of distribution, and the sanitation and safety of foods. Here again, more jobs are available than there are graduates to fill them. The two food technology conferences recently held at the Institute, Professor Proctor said, have given impetus to the formation of a new professional organization in this field, one in which Dean

Prescott has been a prime mover for many years. In the research program at the Institute, he said, both canning and refrigeration have been of particular interest. Quick freezing is providing interesting fields for investigation. Biochemical methods for quality control, and pilot plant work for students through the co-operation of the Dewey and Almy Chemical Company were discussed.

Professor Bunker, describing engineering as the organizing and directing of available agencies and materials for the benefit of mankind, explained that when such organized applications are in the scientific area of biology, the activity is known as biological engineering. In the development of this field in the future, he held, biophysics — exploiting the techniques of measurement evolved in experimental physics — will be of major importance, much as biochemistry has already contributed so greatly to the advance of biological knowledge. Biological engineering at the Institute follows a curriculum instituted in 1937 as Course VII-A and designed to engender competence in both biology and physics together. As typical examples of the work going on, Dr. Bunker described investigation of the wavelengths of ultraviolet light most efficacious in forming vitamin D in the skin of living animals, during which greater precision in radiation measurements was secured; and the development of a photocell-amplifier-meter device permitting food technologists to read directly from a dial the degree of rancidity in fats of foods. A third and most interesting project was demonstrated — the depiction of the electric waves generated by the heartbeats of a subject, shown as fluctuations in



Fairchild

The Institute's plant viewed lengthwise from the air. Visible to the west of Massachusetts Avenue are the new track and field house made possible last year by support of the alumni athletic fund. In the oval of the track in the foreground, a high rate of constructional activity is now bringing the new swimming pool building into final shape.

a wavy line moving across a movie screen an instant after each beat. The projection oscillograph used in this demonstration has been developed in the biological engineering laboratories. The same method can be used in part to record brain waves, depiction of which at the meeting was prevented — not by the absence of brain activity — but by interference from an amateur radio broadcaster near by. The oscillograph is capable of extremely high amplification, as indeed it must be, since the powers of a brain wave are such that the output of 2×10^9 persons would be required to flash a 150-watt lamp.

SAFETY IS GOOD MANAGEMENT

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years. The program thus may start with proper orientation. A safety committee consisting of one representative each from the different departments of the organization is a helpful advisory group to executives and an aid in obtaining a co-ordinated and co-operative program. The committee should be fully familiar with the hazards of the plant and should prepare the program to be promulgated by the management.

The adoption of recognized existing safe-practice standards is recommended. Typical of such standards are those of the American Standards Association, National Safety Council, and the National Fire Protection Association. Lists of approved equipment which meet safe standards, published by the Underwriters' Laboratories, Inc., United States Bureau of Mines, and the United States Bureau of Marine Inspection and Navigation, are valuable in the selection of equipment.

Accident-hazard inspections should be made by the director of safety or a member of his staff. The more thorough his inspection and the more adequate his report on the inspection, the more effective will be the results of inspection work. Reports of a professional quality are usable in planning for future expansion as well as in the correction of immediate defective conditions. When an organization has numerous plants, a keyman at each plant should be trained to make periodic self-inspections. Such inspections are helpful in establishing and maintaining a high standard of safety.

Plans should be reviewed to see that safe practices have been incorporated in the construction drawings. In a large organization this may be a very important function of the safety division. Adequate fire protection and accident-prevention safeguards usually lower the annual overhead by savings in insurance premiums.

Discrimination is recommended in the selection of posters. Good ones have educational value. Posters may be purchased, may be prepared under the direction of the company's safety committee in special cases, or may be obtained from insurance companies.

Instruction in first aid is considered important not only to provide for care in emergencies but also to develop safety consciousness.

Employees should be encouraged to submit suggestions for improvements. It has been found advantageous to allow employees leeway in the matter of signing or

not signing their suggestions. A box, conveniently and conspicuously located, is recommended for suggestions. Provision should be made for the reporting of accidents. The time spent in the preparation of adequate report forms is a good investment. Emphasis on factors which will assist in determining causes of accidents is recommended. Carefully prepared instructions to be followed in the use of the form will be needed in order that good reports on accidents may be submitted.

Instructions for the investigation of serious accidents should be prepared. Such instructions will result in less lost motion and a more direct analysis of conditions which led to the accident. Photographs and diagrams are urged to supplement the text of investigations.

Printed safety rules, based upon the experience of safe procedure in a given plant, are considered good practice. Where this procedure is followed, a copy of the rules is given to each employee, who is expected to familiarize himself with them and inform his employer that he has done so.

To record the progress in accident prevention, preparation of useful statistics is advisable. The frequency rate (number of disabling injuries per million man-hours worked) and the severity rate (number of days lost per thousand hours worked) are two rates commonly used for statistical analysis of accident trends.⁸

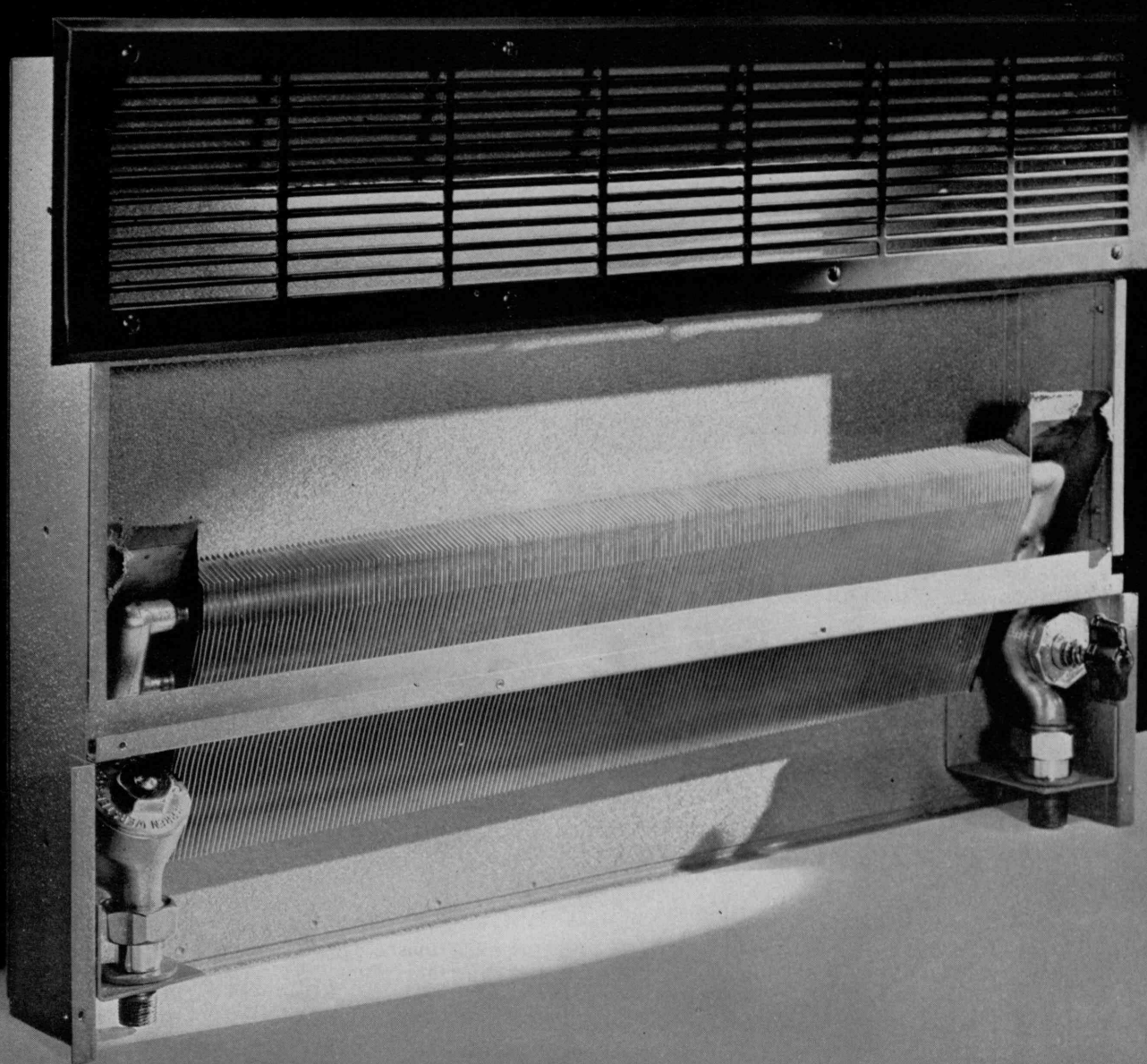
Personnel training in safe practices,¹⁹ job analyses, physical examinations, aptitude tests, and use of the services of psychiatrists, particularly in accident-prone cases, are other activities that are followed by some organizations.

Fire protection and safety are of interest to the architect and every branch of the engineering profession. Factors of safety are familiar terms in architectural and engineering design, but safety in relation to fire prevention and fire protection and to accident prevention is apparently not so familiar to either the architect or engineer as a general rule. Attention has been called to the interest taken in safety by the board of directors of a large company and to the expenditure of funds for safety by industry. In view of this interest on the part of management, safety merits attention in the curricula of engineering and architectural schools.

How can such training be included in existing overcrowded programs? A reasonable solution seems to be the teaching of fundamentals of fire protection and safety in existing courses. Some knowledge of available standards and safe practices would be helpful to those who may expect to face problems in practice for which rules have been issued by states or regulatory bodies.

Usually the prevention of accidents may be effected by the elimination of faulty practices of a rather commonplace type. At other times, elements of design are involved which may contribute to a catastrophe such as the New London, Texas, school disaster, caused by a leak from a natural-gas main.²⁶ Numerous other examples could be stated in which explosions or fires resulted from conditions relating to design.

The instruction material should permit flexibility, so that proper emphasis may be placed where it will do the greatest good. Students in engineering and business administration should be informed of the human approach in accident prevention and of the *(Concluded on page 206)*



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SAFETY IS GOOD MANAGEMENT

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relation of workmen's compensation insurance rates to accident experience. Architects and engineers should be informed of existing fire protection and safety standards and of their use in building codes.²⁴ Mining engineers should be familiar with the hazards of mining and tunneling. Civil engineers should know something of the hazards in construction and the importance of fire-protection demands on the design of water systems. Illustrative of problems that arise in design, construction, and operating practices are the fire resistance of different types of construction; exit requirements in buildings and safe enclosures for exits; characteristics of common flammable vapors and the influence of such vapors on safe design; choice of materials for floor surfaces and the effect of materials on falls of persons; the dust hazard and methods of dust removal in construction and in manufacturing operations.

Such training should be of inestimable value in the development of justifiable resistance to pressure groups who may be active in lowering fire protection and safety standards in building codes and other regulations.

The teaching problem in safety is complicated by the absence of a suitable textbook.¹⁰ For fire protection, handbooks that should be of assistance are available,^{22, 23} and further efforts now being made by the National Fire Protection Association may be expected to assist in teaching important fundamentals of fire protection in architectural and engineering schools.²⁷

References

- ¹ *Proceedings of the First Co-operative Safety Congress*, Milwaukee, Wis., September 30 to October 5, 1912, under auspices of the Association of Iron and Steel Electrical Engineers.
- ² United States Bureau of Labor, *Report on Conditions of Employment in the Iron and Steel Industry in the United States*. Volume IV: *Accidents and Accident Prevention* (Washington: Government Printing Office, 1913).
- ³ United States Senate, Report from the Committee on Mines and Mining Establishing the Bureau of Mines in the Interior Department, Senate Report No. 692, May 25, 1908.
- ⁴ Lewis DeBlois, "Organisation of Safety Services in Industrial Undertakings in the U. S. A.," *Industrial Safety Survey* (Geneva: International Labour Office), XIV (September-October, 1938), 132-142.
- ⁵ Associated General Contractors of America, *Manual of Accident Prevention in Construction* (1938).
- ⁶ H. W. Heinrich, assistant superintendent, engineering and inspection division, Travelers Insurance Company, *Industrial Accident Prevention; a Scientific Approach* (New York: McGraw-Hill Book Company, Inc., 1931).
- ⁷ American Standards approved by the American Standards Association. American Standards Association, 29 West 39th Street, New York, N. Y.
- ⁸ American Standards Association, "Method of Compiling Industrial Injury Rates," Z16.1-1937.
- ⁹ H. W. Heinrich, "The Accident Sequence," (Hartford: Travelers Insurance Company).
- ¹⁰ E. A. Holbrook, dean, school of engineering and mines, University of Pittsburgh, "Training Future Safety Engineers," *National Safety News*, XXXVI (December, 1937), 13.
- ¹¹ S. I. Cooper, manager, Southern Pacific Steamship Lines, "Start at the Top," *Safety Engineering*, LXXVII (May, 1939), 10-12.

¹² "The Incidental Cost of Accidents to the Employer," *Travelers Standard* (Hartford: Travelers Insurance Company), XV (November, 1927), 221-231.

¹³ Max D. Kossoris and Swen Kjaer, Bureau of Labor Statistics, "Industrial Injuries in the United States During 1938," *Monthly Labor Review* (Washington: United States Department of Labor), XLIX (October, 1939), 869.

¹⁴ Charles R. Hook, President, American Rolling Mill Company, "Industrial Safety — Its Relation to the Business of Today," *Transactions of the National Safety Congress*, October, 1938, p. 21.

¹⁵ An Act for the Protection of the Lives of Miners in the Territories, "United States General Statutes at Large," XXVI (1889-1891), 1104.

¹⁶ United States Department of Labor, "Workmen's Compensation Legislation of the United States and Canada as of January 1, 1929," Bureau of Labor Statistics Bulletin No. 496.

¹⁷ Max D. Kossoris and Swen Kjaer, "Causes and Prevention of Accidents in the Construction Industry, 1936," *Monthly Labor Review*, XLVII (August, 1938), 329-340.

¹⁸ J. H. Vernor, Vice-President and general manager, Western Clock Company, Ltd., "Small Plant Safety," *Safety Engineering*, LXXVII (May, 1939), 7-9.

¹⁹ Federal Board for Vocational Education, Bulletin No. 164, "Report of a Training Course for Foreman Conference Leaders" (Washington: Government Printing Office, 10 cents, June, 1932).

²⁰ United States Department of the Interior, "A Safety Program for the National Park Service, Office of Indian Affairs, and Bureau of Reclamation. Report to the Secretary of the Interior of the Committee on Health and Safety, Appointed April 2, 1936" (Washington: Government Printing Office, 10 cents, May, 1937).

²¹ Metropolitan Life Insurance Company, New York, N. Y., "Getting Results from Safety Work"; "Getting Facts about Accidents"; "Directing the Plant Safety Work"; "Safety Meetings"; "Making the Plant Safe"; "Safety Activities in Small Companies."

²² Crosby-Fiske-Forster *Handbook of Fire Protection* (8th ed.; Boston: National Fire Protection Association, 1935).

²³ United States Federal Fire Council, *Manual of Fire-Loss Prevention of the Federal Fire Council* (Washington: National Bureau of Standards Handbook No. 19, 1934).

²⁴ George N. Thompson, "Preparation and Revision of Building Codes" (Washington: National Bureau of Standards Building Materials and Structures Report No. 19, 1939).

²⁵ Frank L. Ahern, "Seeing America Safely," *National Safety News*, XXXIX (April, 1939), 25.

²⁶ United States Senate, Report by Dr. David J. Price on Investigation of Explosion at Consolidated School, New London, Texas (Washington: Senate Document No. 56, Government Printing Office, March 18, 1937).

²⁷ "Committee on Fire Protection Engineering Education Voted by Board of Directors of the Association," *Quarterly of the National Fire Protection Association*, XXXIII (July, 1939), 9.

THEY BEAT THE CLIPPERS

(Continued from page 194)

While the side-lever engine was being perfected in England and Scotland, the beam engine was being made a highly effective power plant for river and sound steamers in the United States through the skill of Robert L. Stevens of Hoboken, James P. Allaire of New York, and the designers of other famous American engine building firms such as the West Point Foundry and the Novelty Iron Works. American (Continued on page 208)



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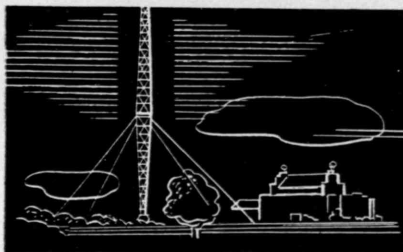
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THEY BEAT THE CLIPPERS

(Continued from page 206)

engineers of this period showed a much greater willingness than their British contemporaries to use high steam pressures, particularly on river steamers, and the steamboats plying the inland waters and sounds of the United States in the 1820's were far faster than any steamers to be found abroad. They were also much more prone to disastrous boiler explosions.

It was very natural that steamboatmen, having found their vessels satisfactory on river, lake, and even coasting voyages, should begin to think of using vessels driven by steam power on long ocean voyages. One was first attempted by the *Savannah*, which, contrary to the impression created by some school histories, was more of an auxiliary than a steamer, as it is not conceivable that her owners believed her to have sufficient fuel capacity to cross the Atlantic under power alone. She made one voyage to Europe in 1819, to Liverpool from Savannah in a time variously reported, which we set at twenty-nine days four hours, during which the engine was used for eighty hours, say some historians, for ninety-one hours say others, but long enough anyway to exhaust the fuel supply. Upon the return of the ship to the Georgia town for which she was named, her inclined, jet-condensing, direct-acting engine, built by Stephen Vail of Morristown, was removed.

A more modest and successful steamship venture was undertaken the year of the *Savannah's* voyage when the steamer *Robert Fulton* started running from New York to Charleston, Cuba, and New Orleans. About five years later, a much longer voyage was made when the steamer *Enterprise* reached India from England via the Cape of Good Hope. Still later, in 1827 to be exact, Atlantic steam navigation was commenced by the little Dutch steamship *Curaçao*, which made the first of her several voyages from Rotterdam to Dutch Guiana and the West Indies. In 1831, the Canadian-built *Royal William* crossed the Atlantic successfully from Montreal to London via Pictou and Cowes under the power of her side-lever paddle engines assisted by sail, and in 1833 the British naval paddle steamer *Radamanthus* was taken to Jamaica. These occasional ocean voyages by steam vessels, the growing popularity of the steamer as a mail and passenger carrier on inland and coastal waters, and the mounting dissatisfaction of the public with the irregular and unscheduled transatlantic mail and passenger services provided by the sailing ships led in the middle 1830's to animated discussion of the practicability of the steamer for Atlantic crossings.

This was the period in which the great American clipper ships were developing. The undoubted superiority of American sailing ships over the sailing vessels of other countries, and the comparatively high state of development of the Clyde-built side-lever paddle engine as used in coasting vessels and channel packets were undoubtedly important in fostering the initiation of Atlantic steamship lines by British rather than American organizations. In any competition it is natural for the side which appears to be losing to be readiest to try new methods, especially if it seems better prepared than its opponents to use the new methods under consideration.

There can be little doubt that the side-lever paddle engine of the 1830's was the best seagoing marine engine then in existence. It had most of the good qualities of the American beam engine plus the advantages, for ocean-going steamers, of a low center of gravity and an absence of overhead openings through which water might be shipped in bad weather; and except for the inevitable smokestack, it offered no obstructions abovedeck to the handling of auxiliary sails.

In 1838, two British steamship lines undertook, then, to compete with our best sailing ships in the Atlantic trade. The power plants with which the engine builders of England and Scotland proposed to defeat our great clippers were two-cylinder side-lever paddle engines taking steam from copper boilers shaped to fit the spaces in which they were installed and stayed to resist the pressures of ten or fifteen pounds at which they worked. Pressures were in fact so low that it was possible for the pressure in one of these boilers to fall below that of the atmosphere, and hence the boilers were fitted with inward-opening relief valves as well as outward-opening safety valves to give protection against collapse from external atmospheric pressure as well as bursting from internal steam pressure. Pressure gauges were mercury U tubes. Jet condensers were usually installed, and sea water was used as boiler feed. It gave little trouble, as no hard scale was formed at the temperatures at which these low-pressure boilers made steam, though a few steamers, among them the *Sirius*, first steamship to complete an Atlantic passage in regular commercial service, used fresh water furnished by a surface condenser.

With engines of this type, the pioneer paddle-wheel liners, *Sirius*, *Great Western*, *British Queen*, *Royal William* (not the earlier Canadian steamer of the same name), and *Liverpool*, proved that steam vessels could carry enough fuel to cross the Atlantic under ordinary conditions. They carried sail when the wind was fair, but the ships were essentially steamers, the sails and not the engines being the auxiliary motive power. Furthermore, they at once began to make crossings with a speed and regularity that the clippers could not equal. Given favorable conditions, the clippers could travel far faster through the water, at times reaching speeds of 18 and 19 knots, but they could not equal the fourteen- to twenty-day Atlantic passages of their despised, wheezing, smoke-grimed competitors.

The success of the pioneer Atlantic steamers of 1838 and 1839 led to the establishment of several lines in the 1840's. Two were American lines, one of which ran to Bremerhaven and the other to Havre, and another was the Cunard line which originally ran from Liverpool to Boston by way of Halifax. The Collins line, most famous of early American Atlantic steamship lines, was also organized during this decade but did not commence operations until 1850. With the exception of Brunel's wrought-iron-hulled screw-steamer *Great Britain*, which came out in 1843, the liners of the 1840's were wood paddle boats with low-pressure, jet-condensing, side-lever engines. Pressures began to creep up toward the end of the decade, but it is significant that Allaire, who in 1828 had used (Continued on page 210)

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THEY BEAT THE CLIPPERS

(Continued from page 208)

relatively high steam pressures in river boats, built jet-condensing side-lever engines using steam at only 17 pounds' pressure for the Collins liners *Atlantic* and *Pacific*, which went into service in 1850. Probably low pressures were adhered to out of deference to public opinion, because of doubt that surface condensers could be kept tight enough to yield a satisfactory feed water for high-pressure boilers, and because practical engine builders were still ignorant of the fact that high pressures and temperatures were essential to economy. Great strides were being made, however, in the mechanics of engine building, one of the great advances being the invention of the steam hammer by Nasmyth, an appliance that made possible the forging of shafts of a size and quality that could not be produced by hand forging. The decade was one in which the popularity of ocean steamers increased enormously and by its end, steam vessels had pretty well monopolized the mail and fast passenger traffic on the North Atlantic, leaving in the hands of the sailing packets, however, the profitable immigrant trade and all the heavy freight business.

A spectacular struggle between the Collins and Cunard lines for the speed supremacy of the Atlantic occurred in the early 1850's, with the Collins boats winning handsomely thanks to their superior lines and superior machinery, for the ship and engine builders of New York, in turning out the Collins boats, beat the British at their own game and beat them badly. Unfortunately after running for only a few years, the line lost two of its ships and the lives of many passengers, and went out of business when Congress withdrew its subsidy in 1857. But the important development of the early 1850's was not the speed contest between Collins and Cunard; it was the introduction by the Inman line of iron screw-steamers that could make money in the immigrant trade. When the propeller was first introduced, conservative engine builders preferred to run their screw engines at the familiar fifteen to twenty revolutions of a paddle engine and gear them to the screw shaft which had to run at three or four times that speed.

An inverted V engine and chain transmission were used on the *Great Britain*, but proved troublesome and were replaced by an oscillating engine connected to the propeller shaft by wood-toothed gearing. It was apparent to many engineers that the engine of a screw steamer should be directly connected to the propeller shaft, Ericsson being one of the early proponents of the direct-connected engine. Many curious and ingenious direct-connected engines were tried in the early days of the screw, among them the engine designed by Ericsson for the U.S.S. *Princeton*, which had oscillating vanes working in semicylinders after the fashion of the automobile windshield wiper of today. Many other more or less freakish horizontal and inclined direct-connected screw engines appeared before Messrs. J. and G. Thompson began building vertical engines with the cylinders mounted directly over the crankshaft. Because these engines had the unusual feature of having the piston rod come out of the bottom instead of the top

of the cylinders, and possibly because they were essentially a Gorgon engine turned upside down, they were called inverted engines, a name which persists today in our technical literature though for many years the inverted engine has been the standard type in use the world over.

The rest of the story of the development of the reciprocating marine engine is the story of its refinement and improvement through the application to its design of the science of thermodynamics and the utilization of steel in its construction. Though Sadi Carnot had in 1824 published a wonderfully farsighted essay on the theory of heat engines, its importance was not realized by engineers until William Thomson, later Lord Kelvin, brought it to their attention in 1848 and 1849. In the meantime, James Prescott Joule had undertaken research into the relationship between mechanical energy and heat, had formulated the doctrine of the conservation of energy, and finally had published the results of many independent determinations of the mechanical equivalent of heat. Hence in the 1850's, thermodynamics developed rapidly from a field of research for the physicist into an applied science for the designing and operating engineer. Rankine's *Manual of the Steam Engine*, published in 1859, giving the practicing engineer an opportunity to utilize the new science in his everyday work. But nine years before this book appeared, American engineers were anticipating its doctrines, Erastus W. Smith and John Baird in 1850 having designed a compound beam engine using steam at 100 pounds' pressure for the Great Lakes steamer *Buckeye State*. The engine was built by the Allaire Works and proved a great success. Similarly in 1853, John Elder of Glasgow began fitting seagoing vessels with surface-condensing compound engines using high-pressure steam furnished by cylindrical boilers. There were of course conservatives who preferred the good old way of doing things. In 1862, the Cunard line brought out the 400-foot wrought-iron *Scotia*, largest, swiftest, and last of the paddle-wheel liners, driven by low-pressure side-lever engines. She was fast, but so wasteful of fuel that she could not compete with screw-boats fitted with more modern and economical types of machinery, and was withdrawn after a few years' service. In 1871, the first White Star liners introduced the compound engine to the Atlantic express service and three years later, A. C. Kirk brought out the triple-expansion engine, which came into general use in the 1880's. The quadruple-expansion engine came into use a few years later. These two types of marine engine, the triple and quadruple expansion, were so economical that they enabled the tramp steamer to complete the conquest of sail.

The reciprocating engine has been superseded by the turbine as a power plant for our larger and faster steamers, both commercial and naval; and the Diesel engine is making great inroads into its field as a power plant for freighters; but those who realize the progress in ocean transportation made during the day of the reciprocating engine will always have a warm spot in their hearts for the wonderful old machines of which M'Andrew said, as he listened to their rhythmic throb, "Eh, Lord! They're grand — they're grand."



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HARNESS FOR APOLLO'S HORSES

(Continued from page 196)

or cuprous oxide — knocks electrons loose. These, migrating preferentially through the blocking layer to the adjacent conductor, produce a difference in potential, so that a photocurrent flows. At present, the output is very weak, a matter of fly power rather than horsepower.

To improve the efficiency of such converters, the desirable approach is to find out, if possible, how they work; that is, what is the mechanism by which light liberates electrons in the semiconductor, and how and why do these electrons travel in preferred directions through the different materials and across the boundaries? Detailed study of insulators and semiconductors, followed by the construction of blocking-layer photocells from such known components, is the plan being pursued at Technology. If the properties of the parts are known, it is felt, the action of the complete device should be understandable.

For one class of insulators — the single crystal whose molecules are bound together by ions, as in rock salt — electrical and optical properties are already relatively well known. The insulation research laboratory at the Institute has contributed substantially to this knowledge, as was recited in *The Review* for last December. At present, work in that laboratory is concerned with the electrical properties of thin glass sheets, for the shift from the completely regular or repeating internal structure of a crystal to the irregular structure of a glass changes the properties in a way which must be understood for progress in the problem of barrier-layer cells.

Semiconductors are not a new class of material in themselves but are insulators which have been brought into a better state of electronic conduction by heat or by special treatment resulting in structural changes. This transition in two outstanding examples is being studied at Technology. One of the materials being investigated is the salt, silver chloride, which is one of the light-sensitive ingredients of photographic plates. The silver salts have remarkable electrical properties; at very low temperatures silver chloride, for example, insulates perfectly, but its insulating property is destroyed if the crystal is illuminated by a very weak light for a short time. Copper iodide, the second material under examination, is a good insulator if the number of copper atoms in its composition is equaled by the number of iodine atoms. An excess of iodine of only one per thousand, however, will transform the material into a perfect con-

ductor. Changes of such delicacy as this appear fundamental to the knowledge of materials which must be attained in order to allow the construction of a blocking-layer photocell from controlled components.

Both of the ways so far discussed for possible ultimate utilization of solar energy directly are marked by extreme simplicity of apparatus and visible action, and by just as extreme a complexity in the fundamental physical and chemical mechanism involved. The third way now under study at the Institute — the thermoelectric generation of power — is similarly simple and similarly complex. An important characteristic distinguishes it from the first two, however. The photochemical and photoelectrical undertakings hold out the hope of possibly high efficiency of conversion of solar energy, especially of that portion lying in the visible spectrum. But this third way of conversion involves, first of all, a degradation of solar energy to heat at the temperature level of the receiver. Any subsequent conversion into power, whether by thermoelectric means or by the operation of a more conventional heat engine, such as a steam turbine, is then subject to the limitations imposed by the second law of thermodynamics, which relates efficiency of power production to the temperature of the heat source — here the heat source is the receiver of solar energy — and the temperature of the heat sink, which is the atmosphere or cooling water to which the unavoidable excess of energy must be discarded.

The third project makes use of the fact that when two dissimilar conducting materials are joined to form a loop and the two junctions are kept at different temperatures, heat flows into the loop at the hot junction, a portion of its energy is converted to electrical energy, and the rest flows out of the cold junction as heat. The portion released as heat by way of the cold junction is, under the second law of thermodynamics, not available to do work. The phenomenon involved here has itself long been known; many investigators have been led to speculate upon it as a possibility for large-scale thermoelectric power production, but then to dismiss it as unimportant because the effect is so small. The recent discovery, however, of several alloys or compounds having the desired combination of low electrical resistance, low heat conductivity, and high thermoelectric effect has made it distinctly interesting from an engineering as well as a scientific point of view. In the Institute's Department of Metallurgy at present, the thermoelectric power, electrical resistance, and heat conductivity of a number of promising new materials are being

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measured. Examination of the thermoelectric properties of many of the natural minerals in the comprehensive collection of the Department of Geology has disclosed that some of the binary and ternary sulphides — such as compounds of lead sulphide with bismuth sulphide or with bismuth and antimony sulphides — show sufficiently high thermoelectric properties to be of further interest. These materials are being produced synthetically in the metallurgy laboratories, by the methods of powder metallurgy, for use in the investigation. The problem of producing truly homogeneous ternary semiconductor systems is one of considerable difficulty; methods of production and heat treatment are under study.

The results possible from the use of such recently discovered materials are suggested by the fact that an efficiency of 5 per cent in the conversion of thermal to electric energy has already been attained when heat is available at 450 degrees centigrade and is thrown away at 25 degrees centigrade. Of course, the obverse of the thermoelectric phenomenon is of interest as well: Through one of these loops, electric energy may be consumed to produce a difference of temperature between the junctions and thus to provide refrigeration when the warmer of the two temperatures is maintained near that of the atmosphere. By working backward in this fashion, it has been possible to secure temperature differences of the two junctions, under conditions of good thermal insulation, in excess of 40 degrees centigrade. It should be possible to go still farther — generate electricity thermoelectrically by use of a high and an intermediate temperature, then use that energy in a second thermoelectric unit to obtain a low and an intermediate temperature, and thus obtain a heat-operated refrigerator. So little is known about the phenomenon of production of electrical energy thermoelectrically, however, that it

is as yet impossible to predict whether alloys may be discovered which will make this simple process of power generation economically important.

Direct conversion of solar energy to heat, followed by use of that heat in more or less conventional manner — the subject of the fourth project — is one which the layman understands or thinks he understands and which consequently has received wide attention from inventors, engineers, scientists, and, to be inclusive, cranks. Solar engines, solar cookers, and solar hot-water heaters have been the outgrowths of that attention — the hot-water heaters have been in economically sound use for decades. Collectors of sunlight — all these devices are essentially that — can differ in the degree of concentration of sunlight on the receiver, as well as in the insulation and orientation of the receiver. The sunlight may be allowed to fall naturally on the receiver or may be concentrated by mirrors. Insulation may involve covering the receiver with glass plates and air spaces or with vacuum jackets. The receiver may be kept stationary or may be arranged to turn so as to follow the sun. Examples of nearly all possible combinations of these three design features are found in the engineering or patent literature. The problem of collecting sunlight, consequently, is one of engineering more than of invention — one of applying quantitative knowledge of performance characteristics of various types of collectors to the choice of the best collector for a particular use.

As part of the Institute's solar energy research, a special building has been constructed for such a study of collectors and, in addition, for study of the use of the thermal energy so collected. Provided with a south-sloping roof containing a recess to hold collectors, with a large well-insulated tank for heat storage in the basement, and with a recording pyrheliometer for quantitative interpretation of the (*Concluded on page 214*)

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(Concluded from page 213)

performance of collectors, the building will serve for studying different types of collectors as well as their possible uses, such as house heating, summer air conditioning, and power generation.

Flat plates, or so-called hotboxes, the simplest and cheapest form of collector, are being studied first. These are essentially the form long in use in Florida and California for domestic hot water. They consist of blackened copper sheets in metallic contact with the fluid being heated, and have insulation below and several air-spaced layers of glass above to admit incident radiation to the copper plate and to prevent heat loss from the hot plate to the cold outer air. Temperature of heat collection, tilt of the receiver, intensity of incident radiation, number of glass coverpanes, and atmospheric temperature are among the factors being studied — all in relation to the efficiency of the collector. Experimental work has just started, on a roof not yet quite half covered with collectors. Preliminary data indicate that this incomplete system collects enough heat on a clear sunny December day to maintain the building 40 degrees Fahrenheit above outside temperature for about thirty hours.

Whether the use of flat-plate collectors together with a storage system is economically possible for house heating or air conditioning in certain areas of the earth, whether other types of collector will prove cheaper for these uses or for power generation, whether power generation from solar heat demands the development of a new heat-engine cycle, and whether power generation by any process dependent on direct conversion of sunlight into heat with consequent unavoidable losses due to the degradation of energy is sound — these are questions which this program may help to answer.

MAIL RETURNS

(Concluded from page 178)

year! Thefe I expect I have been led to underftand, by a dream, and fome difcourfe to which that dream adverted, were cut off for finning and fighting against God! But the vile book remained, and the fever was fent more than once afterwards to Philadelphia. The book I expect fpread in other places, and the fever followed it. In 1796 the fecond part of the book was printed I expect at Newburyport: and the fame year the yellow fever made dreadful havoc there. . . ."

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¶ By GEORGE J. MEAD '16, winner of the Sylvanus Albert Reed Award for 1939 "for the design and development of high output aircraft engines for military and commercial services."

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¶ By JAMES H. DOOLITTLE '24, winner of the presidency of the Institute of the Aeronautical Sciences for 1940, by vote of the executive council.

All's Write

¶ With WILLIAM COUPER '06, author of *One Hundred Years at V.M.I.*, four volumes, Garrett and Massie, Richmond, Va.

¶ With PAGE GOLSAN '12, author of "Protection for Corporate Trustees," *Trusts and Estates*, December.

¶ With TENNEY L. DAVIS '13, author of "High Explosive Bombs," *Army Ordnance*, September-October; condensed in *Science Digest*, February.

¶ With SAMUEL CHAMBERLAIN '18, author of *New England Doorways*, a volume of 200 captioned photographs, Hastings House, New York.

¶ With JOHN T. RULE '21, author of "The Photography of Illusion," *American Scholar*, autumn; condensed in *Science Digest*, February.

¶ With JAMES K. CLAPP '23, author of "A Broadcast Frequency Monitor for the 20-Cycle Rule," *General Radio Experimenter*, January.

¶ With ROBERT A. ENGEL '27, author of "Modern Antiseptics for the Rubber Industry," *Rubber Age*, December.

¶ With HAROLD R. BELLINSON '34, author of "Twist Determination in Single Yarns," *Textile Research*, January.

¶ With ROBERT P. BIGELOW, Emeritus, author of "Harry Walter Tyler," *Isis*, November.

Warning

¶ Impostors are again at work representing themselves to be Alumni of M.I.T. or of other schools. They are approaching our Alumni with very plausible stories of hard luck or automobile accidents, and requesting financial assistance to get them to their homes or to some other place where they have financial resources. Any Alumnus who is approached should doubt the story, no matter how true it may ring, and he will be doing a good service to fellow Alumni if on some plea he can arrange for a later interview and have police present when the man comes back.

Front and Center

¶ THOMAS G. CHAPMAN '09, for the deanship of the college of mines at the University of Arizona and the directorship of the Arizona Bureau of Mines.

¶ HOWARD L. KING '15, for the Construction Engineering Prize from the American Society of Civil Engineers.

¶ HERBERT B. LARNER '18, for the presidency of the Glen Ridge, N.J., board of health.

¶ BENJAMIN K. HOUGH, JR., '28, for the Collingwood Prize for juniors from the American Society of Civil Engineers.

¶ WILLIAM EMERSON, Emeritus, for the presidency of the Boston Society of Architects. ELIOT T. PUTNAM, Staff, for re-election to the vice-presidency.

DEATHS

* Mentioned in class notes.

¶ FRANCIS BACON '77, February 5.

¶ SULLIVAN A. SARGENT '79, January 7.*

¶ ABRAHAM LEWIS '81, January 23.

¶ ELIZABETH J. WOODWARD '81, January 11.

¶ ARTHUR FARRAGUT TOWNSEND '84, January 14. Fifty-five of Colonel Townsend's seventy-four years were spent in the rubber industry, which recognized him as one of its leaders.

An organizer of the Manhattan Rubber Manufacturing Company of Passaic, N.J., he served successively as secretary, vice-president, and, from 1903 until 1929, as president. Since 1929, he had been chairman of the board of Raybestos-Manhattan, Inc., and general manager of the Manhattan Rubber Manufacturing Division. Outstanding among the honors which came to Colonel Townsend was his selection as American member of the advisory panel of the International Rubber Regulation Committee in London.

¶ GEORGE H. NYE '85, January 20.*

¶ CHARLES H. WOODBURY '86, January 21.*

¶ WILLIAM C. CUSHING '87, January 11.*

¶ FRED B. COLE '88, January 13.*

¶ EVERETT S. JONES '88, January 6.*

¶ FOSTER P. RANLETT '88, January 4.*

¶ MOSES LYMAN, JR., '90, July 12.*

¶ GEORGE A. SONNEMANN '90, December 28.*

¶ EDMUND SHAW '92, December 11.

¶ PARKER C. NEWBIGIN '94, January 22.

¶ FRANKLIN T. MILLER '95, January 29.

¶ GEORGE W. TORREY '95, December 20.*

¶ GEORGE S. WHITESIDE '95, January 29.

¶ ANDREW GREEN '96, December 29.*

¶ THOMAS E. TALLMADGE '98, January 1.*

¶ WILLIAM G. PIGEON '00, December 22.*

¶ PAUL E. CHALIFOUX '02, January 17.

¶ PAUL HOOKER '02, January 12.*

¶ EDWIN GOODWIN '03, November 1.

¶ JAMES S. CURRIER '04, November 25.*

¶ WARD P. DELANO '05, January 10.*

¶ WALTER B. GONDER '07, January 16.*

¶ CHARLES L. PITKIN '08, December 17.*

¶ HERBERT H. BENNETT '09, January 15.

¶ ALBERT C. ALBEE '12, January 9.*

¶ STEWART R. ROBERTSON '12, January 20.

¶ E. LEO BALL '16, October 5.

¶ JOSEPH PAIGE '22, January 10.

¶ LEONARD W. OLSON '25, December 20.*

¶ EARL F. GREENMAN '27, January 16.

NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

Technology Club of Albany

Under the guidance of our President, Bill Scofield '23, our Club has held two successful dinner meetings, on October 23 and December 4 at the Albany University Club. These meetings were both well attended, and an increasing enthusiasm is being noted. Our speaker at the first dinner was Carl F. W. Lange, associate bacteriologist of the New York State Department of Health, who discussed "Thirty Years of War on a Disease." At the second meeting George Wriston, of Spencer Trask and Company, presented an extremely interesting talk, "Bill of Rights." One of the high lights of these gatherings is the lively question period which follows the talks. — We have also held two noonday luncheon meetings at the Hotel Wellington, on November 27 and January 8. These are our first attempts at luncheon meetings, and the response has fully justified continuing them on a monthly basis.

In making the Club so successful this year Bill Scofield is being ably assisted by his two Vice-Presidents, Paul Hillard '22 and John G. Fairfield '16, and by an active program committee consisting of Harold Hedberg '20 and Andy Allen '12. An attendance committee made up of John Fairfield, Ed Sargent '07, C. Hancock Wood '91, and the Secretary has been functioning smoothly. — CARL H. ANDERSON '27, *Secretary*, New York Telephone Company, 158 State Street, Albany, N.Y.

Boston Alumni Midwinter Meeting

Crowding Walker Memorial, Greater Boston Alumni staged a regular homecoming on the occasion of their midwinter meeting on January 10. Three hundred and twenty-five were on hand for a buffet supper in North Hall, spending an hour and a quarter eating, visiting, reminiscing. Thereafter, their numbers increased to about 600, they heard Raymond Stevens '17, Vice-President of the Alumni Association, as master of ceremonies, introduce Francis A. Barrett '24, chairman of the committee on arrangements for the evening, who spoke in his capacity as chairman of Alumni Day 1940; and President Karl T. Compton recount briefly various interesting details of Institute activity and administration. The program speaker was J. O. Perrine of the American Telephone and Telegraph Company, whose lecture-demonstration, "Words, Waves, and Wires," was an extremely interesting and nontechnical discussion of the behavior of sounds as modern telephone research handles them.

Double-chairman Barrett, delighted with the response to this midwinter opportunity, observed that it set an excellent precedent for record-breaking attendance at Alumni Day on June 3, the subject of which likewise was prognosticated by the Boston program. The art of communication, and the effects of science upon it, will be the topic in June, he reported; the Alumni Day committee is already at work on arrangements. President Compton, commenting on analyses of the Institute's operating expenses, presented a breakdown of figures showing that to educate one undergraduate one year costs \$766.

Dr. Perrine utilized in the course of his talk several highly interesting pieces of apparatus, including a special loud-speaker weighing 600 pounds and equipped with four separate throats, by means of which he was able literally to turn inside out various popular classical musical numbers to show their frequency-range requirements. After his talk, Dr. Perrine was treated to a barrage of questions, which were the best evidence of his audience's appreciation.

The committee on arrangements included, in addition to Mr. Barrett, Charles F. Park '92, Samuel Shapira '05, Azel W. Mack '15, and Philip H. Peters '37.

Technology Club of New York

The Club is in the midst of the most active winter season in a decade. Membership is at the highest point since 1929, and more men are using the Club than was true even in the old Gramercy Park days. Invariably the private dining rooms are crowded for luncheon, and a good-sized group is present for dinner. The taproom has become a popular oasis and meeting place for Technology Alumni in New York City and is especially popular with the commuters, who drop in before running for the "5:32" in the evening. Applications received for living quarters at the Club are being filled in order, as vacancies become available. The employment bureau of the Club again has more positions than qualified applicants to fill them.

There have been many class and course functions. For examples, the Class of 1922 had a dinner on December 7 at which President Compton was the principal speaker. On the following evening, the Class of 1927 held a dinner. On January 18, Course I held the luncheon given annually at the time of the New York convention of the American Society of Civil Engineers. Many Institute faculty members were present. On the same day Course XI held a special meeting and get-together at the Club. On January 23 a group of Jersey Alumni met at the Club for luncheon.

An evening meeting for members, at which an especially beautiful moving picture of skiing was shown, drew a large crowd. January 28 was ladies' day at the Club, with open house throughout the day and a large *smörgåsbord* providing refreshment in the afternoon.

The Club's annual dinner will be held this year on March 5 at the Waldorf-Astoria Hotel in celebration of Dr. Compton's tenth anniversary at the Institute. Frank B. Jewett '03, President of the Alumni Association, will be one of the principal speakers. The dinner will be held in the main ballroom of the hotel. As in previous years, those attending will be admitted to the Empire Room, without cover charge, for dancing afterward. — JAMES P. EDER '34, *Secretary*, 24 East 39th Street, New York, N.Y. CONSTANTINE S. DADAKIS '34, *Publicity Committee*, 644 Riverside Drive, New York, N.Y.

Technology Club of Philadelphia

The weekly Monday luncheons, reported last month as taking place at McCorkle's Restaurant in Wilmington, Del., are instead held at McConnell's Restaurant on 9th Street, between Orange and Tatnall streets. — PHILIP M. ALDEN '22, *Secretary*, 1000 Chestnut Street, Philadelphia, Pa.

M.I.T. Club of Western Pennsylvania

At a meeting at the Wildwood Country Club last June, the following officers were elected for 1939-1940: President, Charles M. Boardman '25; Vice-President, Elbridge J. Casselman '15; Treasurer, Martin L. Tressel '24; Secretary, F. Reed Dallye '22; Assistant Secretary for membership, E. Neal Wells '29; and Assistant Secretary for publicity, William C. Ridge '24. — We met again on October 5 at the University Club for dinner followed by bridge and informal discussion. — B. Alden Thresher '20, Director of Admissions at the Institute, and Samuel C. Prescott '94, Dean of Science, were our guests at dinner on October 18 at the same place. — After our dinner meeting at the University Club on December 15, Francis J. Chesterman '05 showed us five reels of his excellent color movies of Norway, the North Cape, Denmark, and Sweden.

The annual Christmas luncheon for M.I.T. students was held on December 27 in the Dutch Room at the Fort Pitt Hotel. Our guests were Charles I. Beard, G. Ivor W. Collins, Jr., '41, Douglas L. Eckhardt '40, Lewis G. Firth, Jr., '43, Carthrae M. Laffoon, Jr., '42, Harry Ottinger '43, David E. Sunstein '40, and Edward B. Weinberger '41.

William H. Timbie of the Electrical Engineering Department of M.I.T. was our guest and speaker at a dinner on

January 11 at the Schenley Hotel. In connection with his comments on the success of the new scholarship plan, Professor Timbie praised the work of Thomas Spooner '09, chairman of our scholarship committee. Professor Timbie welcomed constructive criticism of the Institute, believing that we, as engineers, would not draw conclusions without having the pertinent facts. — Alumni and students are invited to drop in at our luncheons, every Friday at twelve-fifteen in the main dining room of the Fort Pitt Hotel. — F. REED DALLYE '22, *Secretary*, Aluminum Company of America, 801 Gulf Building, Pittsburgh, Pa. WILLIAM C. RIDGE '24, *Publicity Secretary*, 197 Watson Boulevard, Pittsburgh, Pa.

Berkshire Technology Club

The Berkshire County Alumni are having a supper meeting, Thursday, February 29, at the Stanley Club in Pittsfield, with Horace S. Ford, Treasurer of the Institute, as speaker. Oswald B. Falls, Jr., '36, who was recently elected President of the Club, has been transferred by the General Electric Company to Schenectady, necessitating an election to fill the vacancy. The Honorary President of the organization is Daniel M. Wheeler '68. — WILLIAM L. ROOT, JR., '35, *Secretary* 48 Oxford Street, Pittsfield, Mass.

Technology Club of the Connecticut Valley

On Wednesday, January 10, the Club held its first meeting of the year at the Highland Hotel in Springfield, Mass. Eighty-two Alumni attended. — The Rev. H. Hughes Wagner, President of the Springfield Council of Churches, was the main speaker following the dinner. He spoke on the reincarnation of the lives and philosophies of Karl Marx and Friedrich Nietzsche in Russia and Germany today, and discussed the similarities and differences of the two. Mr. Wagner brought his talk to a close by contrasting these two men's teachings with the Christian philosophy. Thanks go to Martin Kuban, Jr., '37, for getting such a fine speaker to address the Club. The meeting continued in a lighter vein with the showing of some travel film, provided by the Denver and Rio Grande Western Railroad Company, and an industrial film on coal mining.

Plans for the next meeting, which is to be held on Wednesday, March 13, are already under way. Douglas Wesson is scheduled to speak to us on "Eskimos, Umiaks, and Things." Colonel Wesson will illustrate his talk with colored film taken during his trip through Alaska with Father Hubbard, the glacier priest, during the summer season of 1939. The first colored pictures ever taken of an Eskimo walrus hunt on the ice floes should be of great interest to all, especially to those Technology men who intend to include that section of the globe in their future vacation itineraries. Mark down the date now — Wednesday, March 13. Let's have no conflicting engagements

to keep anyone away. Members and guests of all the other Technology Clubs are, of course, cordially invited to attend the dinner and meeting. — JOHN G. WHEALE '38, *Secretary*, Hartford Ordnance District, United States Army, 3640 Main Street, Springfield, Mass.

M.I.T. Club of Central New York

A Christmas-week meeting of the Club was called by Edwin A. Gruppe '22, President, for the purpose of entertaining at dinner as many of the Institute undergraduates residing in this district as were able to accept the invitation. Accordingly, on Thursday evening, December 28, eleven Alumni members, three guests, and seven undergraduates assembled at the University Club in Syracuse for dinner at 6:00 P.M. A most cordial greeting and welcome were extended to the following undergraduates who were able to attend: Melville Clark, Jr., '43, Ronald H. Smith '43, Stewart M. Hill '43, Maurice N. Katz '42, Burton L. Rockwell, Jr., '42, John W. Barker '41, and Joseph F. Owens, Jr., '40. A very pleasant feature of the dinner was a brief talk by each one of these boys, given between courses, recounting either news items about the Institute or, as was done by the first-year members, giving some of their impressions gained from their attendance up to that time. Considering the very short notice which these young men had for putting on such a stunt, they acquitted themselves remarkably well.

During the dinner President Gruppe expressed not only his own personal regret but also reflected a similar sentiment on the part of the club members at the loss of two of our most helpful and loyal members who have transferred their business activities to other localities. He referred to the excellent co-operation given by Edward C. Booth '25 and William H. Eager '04 in their contributions to the life of the Syracuse Club. Their absence will be most keenly felt.

Following the dinner, we were again furnished another treat by Fred W. Barker '12, who showed us his collection of colored still pictures taken during a vacation trip last summer in Europe. This collection included a number of exceptional pictures of the scenery in the Austrian and Italian Tirol. They were certainly very much appreciated. The meeting adjourned about 9:30 P.M. with the committee in charge feeling that another successful evening had been very well spent and thoroughly enjoyed. — HENRY W. BLACKBURN '08, *Secretary*, 615 Fellows Avenue, Syracuse, N.Y.

CLASS NOTES

1879

Sullivan Amory Sargent, well known in Boston musical circles, died on January 7 at his Brookline home. After leaving the Institute, he was for a time engaged in the practice of architecture in Newport,

R.I., but later he gave up his architectural career in order to make music his lifework. For the past thirty-two years he had been a teacher of voice at the New England Conservatory of Music, and since 1898 had been a member of the choir of the Arlington Street Church in Boston. His second wife survives him, as do four children by his first marriage: Sullivan Amory Sargent, Jr., of Needham, President of the Harvard class of 1910; L. Manlius Sargent, a lieutenant in the 101st Field Artillery in France; Mrs. Walter K. Shaw of Concord; and Mrs. Henry S. Rogerson of Brookline.

1881

For several months, we have been hoarding a copy of the Miami, Fla., *Daily News* in which about three columns of text and photographs are devoted to Ernest C. Cole's home on South Bayshore Drive. Now, with March winds making life unpleasant for many of us in the North, we thought you would all enjoy a verbal trip to the land of flowers and warm sunshine.

Not content with inactive retirement, Cole has kept himself busy converting the property he acquired on Biscayne Bay beach into a Floridian landmark and beauty spot. Its grounds now abound with trees and plants from all parts of the world; stone benches and carved vases enhance the gardens. Wrote his interviewer: "Today you may see Cole's home . . . topping a bluff to the right as you drive southward from Miami along the thoroughfare toward Coconut Grove, with orderly landscaped grounds leading up to it, but when he acquired it the property was a tangled mass of tropic vegetation, with the bay waters, at high tide, lapping at the foundations of the bluff on which the house stands."

Far more exciting than the beautification of the property, however, have been the various undertakings to prove that it was once inhabited by pirates. According to the *Daily News*: "Adventure first intrigued Cole when he ran across some old hand-wrought spikes in front of the property, evidence, he believed, that some vessel, in olden times, had run aground there and been consumed by fire. He found support for his belief when, in searching the site, he discovered a lump of metal, apparently melted bullion, which analyzed was found of high silver and gold content. The small treasure, which apparently had been in some container, such as lead, which had melted in the flames, was responsible for Cole giving the name 'Treasure Trove' to his home." Several treasure hunts have been conducted since these first discoveries, but so far no buried fortune has been unearthed.

Cole, it will be recalled, gave up his stove-manufacturing business in Chicago about twenty-five years ago. We quite agree with his interviewer, who says that when Cole bought his property in Miami he "found he had let himself in for more dreams and thrills than most men find in a lifetime of travel." It is a pleasure to record, also, the interviewer's observa-

Come Back to Tech on June 3 — Alumni Day

1881 Continued

tion that our classmate "is active, wiry and alert in spite of his 87 years." — FRANK E. CAME, *Secretary*, Chambly Canton, Quebec, Canada.

1885

Once more '85 mourns the loss of a classmate, for after a long illness George H. Nye passed away on January 20. He was born in New Bedford, Mass., on June 10, 1864, and in 1937 retired after a service of twenty-five years as city engineer in his native city. He had also served the city for over fifty years in various capacities, serving, for example, on the board of appeals, sewer, traffic, and safety committees. This seems to refute the biblical saying that "a prophet is not without honour save in his own country and in his own house." He was a thirty-second degree Mason, a Knight Templar, and had been an officer in various Masonic organizations. He was a frequent attendant at our class luncheons and at past reunions until his health prevented. — ARTHUR K. HUNT, *Secretary*, 145 Longwood Avenue, Brookline, Mass.

1886

Death has taken one of the outstanding members of the Class, Charles H. Woodbury, who died suddenly on January 21 at the home of a friend in Jamaica Plain, Mass. Born in Lynn, Mass., Woodbury came to the Institute from the high school of his native city and elected to take the Course in Mechanical Engineering, in order, as he was wont to say, that he might profit by the scientific training thus acquired should his skill as an artist not keep step with his ambition. But his genius and love for art did not fail him. Soon after his graduation he married Miss Marcia Oakes, who also became an artist of merit. With his wife, Woodbury then spent several years studying in Paris and in travel. Returning to America, he opened a studio in Boston. It was in Boston and along the rugged coast of Maine that the greater part of his work was done. The artist colony at Ogunquit, Maine, recognizes him as its founder and mentor.

Among his many paintings and etchings that have graced the walls of museums of art, both in this country and abroad, his "Mid Ocean," "A Tropical Sea," and "The Lynn Marshes" — to mention only three — are noteworthy examples of his genius. He was the recipient of many prizes for his skill in painting and etching, and he held membership in a long list of societies of art and design. As a teacher he was a visiting lecturer at Wellesley and Dartmouth colleges and at the Art Institute in Chicago. He leaves a son, David O. Woodbury '21, who is now in California and whose most recent book, *The Glass Giant of Palomar*, was published last fall. — ARTHUR G. ROBBINS, *Secretary*, 12 Grove Street, Winchester, Mass.

1887

Your Secretary is pained to announce the death of our distinguished classmate William Channing Cushing, S.B., M.A.,

and LL.D. (the first loss in the Class since late 1938) on January 11 at the home of his daughter, Mrs. Thomas P. Haviland, in Philadelphia. While apparently rallying encouragingly from an attack of pneumonia, he was seized with a heart attack and passed away suddenly and without suffering. Our sympathies go out to Mrs. Haviland in the loss of a beloved parent and a highly esteemed and respected member of the Class. Funeral services were conducted at his daughter's home in Philadelphia, and interment was in Indianapolis, Ind. He was active up to the last in the committee on science and the arts of the Franklin Institute of the State of Pennsylvania, of which he had been a member since his retirement from the railroad.

A letter from William B. Blake, a life-long friend of Cushing, which furnishes a very complete and intimate sketch of his career, is herewith transmitted: "I was surprised and grieved to learn of the death of our classmate William C. Cushing. . . . I was intimately acquainted with him from the time we were fellow civils at M.I.T. He was born in St. John, New Brunswick, March 18, 1863. A few days after graduation in 1887, he entered the service of the Pennsylvania Railroad Company, at Louisville, Ky., as an assistant on the engineering corps of the Louisville division. I entered the same service on September 17, 1887, and we roomed together in Louisville until January, 1889, when he was promoted to engineer of maintenance of way, Cincinnati and Muskingum Valley division, with office at Zanesville, Ohio. Subsequently he held the same position in the Indianapolis and Pittsburgh divisions, was superintendent of the eastern and Pittsburgh divisions, chief engineer of maintenance of way, and at the time of his retirement, May 31, 1932, was engineer of standards with office in Philadelphia. His entire service after leaving M.I.T. was with the Pennsylvania Railroad Company. Cushing was a past president of the American Railway Engineering Association and a member of the American Society of Civil Engineers. Several years ago he was a delegate to a meeting of the International Railway Congress, held in Europe. At the time of his death he was a member of the New England Society of Pennsylvania. I was best man at his marriage to Miss Mary Daye at Indianapolis, Ind., February 14, 1894. He did not marry after Mrs. Cushing's death in September, 1913." A most interesting sketch of his career, in which he paid high tribute to George F. Swain, George W. Kittredge, and Frederick W. Wood, all of the Class of '77, was furnished by Cushing upon your Secretary's request for items of news in 1938 and was the feature of these notes in the January, 1939, Review.

Another note of sadness was conveyed in a recent letter from Albert L. Cushing, announcing the death, on December 14, of a sister who had been a lifelong companion and devoted friend and of whom he was very fond. — George Sever sent his best wishes to the Class for the New

Year and the years beyond. — Arthur Nickels appears to be comfortably settled at 358 Fairbanks Avenue, Winter Park, Fla. He recounts a very enjoyable meeting and dinner with Mosman and Norris while in New York City, en route for Florida, and sends his best wishes for a happy New Year to the Class.

Your Secretary was greatly disappointed at his inability to attend the Greater Boston Alumni meeting on January 10, due to a prior engagement. However, Ben Lane and Winthrop Cole registered appearances on behalf of '87 and greatly enjoyed the affair. — NATHANIEL T. VERY, *Secretary*, 15 Dearborn Street, Salem, Mass.

1888

Charles A. Stone and Edwin S. Webster celebrated the fiftieth anniversary of the founding of Stone and Webster, Inc., on December 20. One year after they were graduated with our Class in the newly formed Course in Electrical Engineering, they set themselves up as consulting electrical engineers; this partnership has expanded into a national organization. Their work covers engineering and construction for all kinds of industries, the supervision of electric, gas, and transportation companies, and the underwriting and sale of securities.

Both Stone and Webster have been with the business continuously for half a century and are serving today as chairman and vice-chairman of the board, respectively. The firm has completed construction work costing more than a billion dollars, has appraised properties having a total valuation of twelve billions, and is now supervising utilities whose annual gross earnings are more than sixty-five millions. At the anniversary celebration in Boston, Webster shook hands with more than six hundred present and former employees; and in New York, Stone received over four hundred. The entire Class is proud of the achievements of their distinguished classmates. May they enjoy long life and happiness.

Golden wedding anniversaries are coming into fashion now. The *Arlington News* had the following in regard to our classmate, Mead: "Mr. and Mrs. Adelbert F. Mead of 27 Jason Street quietly celebrated their golden wedding anniversary with a party for the immediate family, Thursday evening (November 16)."

Recently we ran across a photograph of the golfers who took part in our silver anniversary tournament in 1913 at Wianno. They were Baldwin, Jordan, Snow, Thompson, Adams, Blanchard, and the Secretary. Only three of these now remain "to play the game": Adams, Thompson, and Collins.

We had a very enjoyable visit the other day in Brookline with Smoky Joe Wood and Mrs. Wood. We recalled, among other class events, the "strong-arm" methods he used in "mowing down" the heavy batters of '13 nearly twenty-seven years ago at Osterville. That was a happy day for '88. — Sanford and Mrs. Thompson and their daughter Dorothy entertained the Secretary and Mrs. Collins at

1888 Continued

the Brae Burn Country Club, Newton, not long ago. As there was too much snow on the ground for golf, and as the temperature was in the low twenties, after dinner we sat in front of the blazing logs in the living room and talked of the days when the steam engineering laboratory was located under the steps of the old Rogers Building on Boylston Street and the "chapel" was "just across the way."

And now we come to the sad part of our class notes. We lost three members during January. First, we will mention Everett S. Jones of Cambridge, of whose life we gave a sketch in our February notes. He passed away suddenly on January 6. The Secretary attended the funeral at the First Congregational Church, Cambridge, and found many of Jones's Harvard classmates there, as he spent four years at Harvard after his two years with us at Technology.

Another loss is that of Foster P. Ranlett, civil engineer. We quote the following from the Boston *Evening Transcript* of January 4: "Foster Peirce Ranlett, chief engineer for more than 40 years of the Snead & Company Iron Works of Jersey City, N.J. . . died . . . at the Medical Center, Jersey City. He was 72. . . Before joining the Snead firm in 1898, he worked with different western railroads and also the Brown-Ketchum Iron Works of Indianapolis. Mr. Ranlett was the son of Seth A. and Ellen P. Ranlett. His father was for many years Newton city treasurer. Besides his brother, he leaves his wife and a sister, Miss Katherine M. Ranlett of West Roxbury."

Fred Baker Cole, mechanical engineer, entered the Institute with our Class from Kingston, Mass., where he was born. The year after he was graduated he spent at Technology, teaching descriptive geometry under Professor Linus Faunce '77. Then he was with the Thomson Electric Welding Company, Lynn, Mass., and the Woonsocket Spool and Bobbin Company for short periods. From 1889 to 1892 he was with E. D. Leavitt, engineer, on pumping and mining engine work. From 1892 to 1897 he was with Dean and Main, mill engineers, on design and construction of mills, factories, power plants, boiler and engine works. From 1897 to 1923 he was assistant engineer with Charles T. Main '76, engineer and architect. In 1923 he organized the firm of Cole, Osgood and Kimball, consulting engineers, 220 Devonshire Street, Boston, with which he was connected as senior member until he retired in 1935.

Your Secretary sat beside Fred Cole for four long years at Tech, in every section and course. Cole never got excited or lost his temper. He was a typical Pilgrim, as solid as Plymouth Rock near which he was born. Better men were never born. In 1898 he married Eugenie C. Sears, and they lived happily together for forty-two years. They have one son, Frederick W. Cole of Winchester, Mass. Cole never missed a class meeting, dinner, reunion, or Webster dinner till last spring when his health began to fail. He died on January 13 and will be sadly missed at all of

the future gatherings of the Class. — BERTRAND R. T. COLLINS, *Secretary*, 16 Chauncy Street, Cambridge, Mass.

1890

George A. Sonnemann, who was graduated in Mining, died on December 28 while he and Mrs. Sonnemann were visiting their daughter at Provo, Utah. Before going to Technology he had attended the Boston Latin School, and during 1892 he returned East from Idaho and took a course in electrical installation at what is now the General Electric plant at Lynn, Mass. His first mining work was with the Bunker Hill and Sullivan Company at Wardner, Idaho, in 1891 as surveyor and assayer, and he returned to that company in 1895 as superintendent at Kellogg. He left them in 1898 to undertake mining on his own account, having already done something in this line in 1894. Establishing headquarters at Spokane, he continued to make this his home until the time of his death, operating mining properties and acting as consulting engineer. Properties he had acquired at Rossland, British Columbia, and later the Cumberland Mine at Silver City, Idaho, were sold by him at a profit. For many years he had a very large interest in, and was president of, the Golconda group which owned an important mining section at South Mountain, Idaho. He also owned and managed the Washington Steam Laundry of Spokane.

For twenty years he was a member of the Spokane park board and was active in securing land for new parks and providing playgrounds for children. He had been president of the Inland Empire Association of the M.I.T., an honorary secretary of M.I.T., as well as president of the Associated Engineers of Spokane. During the summer vacation of 1899, the Secretary made a trip on foot with Sonnemann through Nova Scotia, visiting a number of the gold, iron, and manganese operations, and found him a very enjoyable companion. Even when we had to tramp several miles in a pouring rain through deep claylike mud, there was no fuss, and his equable disposition is remembered with pleasure.

Moses Lyman, Jr., died on July 12 at his home in Longmeadow, Mass. Born in Connecticut in 1865, he was the eighth first-born son in direct descent to bear that name. The records show him to have been associated with various foundry and machine tool companies in New England, New York, and Pennsylvania. During the latter part of his life he was traffic manager for the Baush Machine Tool Company in Springfield. He was a member of the Sons of the American Revolution and the Institute of American Genealogy, and was a Shriner.

Harry Noyes, having retired on February 1, 1937, as chief engineer and having become consulting engineer of the Union Carbide Company, has now apparently been drafted on the city council of Niagara Falls to straighten out an unpleasant situation, according to the Niagara Falls *Gazette*. The picture which it prints indicates that Harry is hale and hearty. He

was president of the common council as far back as 1903 and, according to the *Gazette*, has "long been active in civic affairs, and at present is a member of the Board of Education and President of the Memorial Hospital Board. He has been President and a Director of the Niagara Falls Chamber of Commerce and the Niagara Falls Country Club, and served as secretary of the Hospital Service Corporation of Western New York." An editorial, headed, "A Splendid Choice," after referring to insinuations and evil imputations which resulted in a hostile public feeling for the council, adds: "Nothing could serve better to dispel this feeling than the appointment of a man of the calibre of Mr. Noyes. . . . His long residence in the city, his prominence in civic affairs, and his irreproachable character eminently fit him for the responsibility he will assume."

Replies to the notice of our fiftieth anniversary celebration at Marblehead continue to come in slowly. About one-third of the Class have now been heard from. All but eight of these plan to be present. — GEORGE A. PACKARD, *Secretary*, 50 Congress Street, Boston, Mass. HARRY M. GOODWIN, *Assistant Secretary*, Room 4-136, M.I.T., Cambridge, Mass.

1892

Your Secretaries are grieved to report the death of an esteemed and beloved member of our Class. Harry A. Harwood died Sunday, November 26, in Newton Hospital only three hours after being struck by an automobile while walking to his home in Newtonville. He was born in Boston and was graduated from Boston English High School. He was active in Masonic circles, a 32d degree Mason, a life member of Aleppo Temple, and for twenty consecutive years a member of the Royal Order of Scotland. For many years he was active in business as a wholesale jeweler, but had retired before his death.

Laurence B. Manley has notified the Secretary that his address is 143 East Washington Lane, Germantown, Philadelphia, Pa., and he has joined the ranks of the retired members of the Class. The city of Philadelphia is in financial straits and there is no immediate prospect of any continuance of the subway work upon which he has been engaged for the past eighteen years. He sends his best regards to all. — JOHN W. HALL, *Secretary*, 8 Hillside Street, Roxbury, Mass. W. SPENCER HUTCHINSON, *Assistant Secretary*, 75 Federal Street, Boston, Mass.

1894

November was a particularly strenuous month for the Secretary because of the necessity of preparing a number of addresses which were given in early December. Leaving home on Thanksgiving day, he arrived at the University of Illinois at Champaign the next afternoon, and within thirty minutes from the time of alighting from the train was giving a lecture on "Epidemics and Engineering" to a large audience of students and staff at the university. On that same evening he was the principal speaker at a dinner

1894 Continued

of the Bacteriological Society, where his topic was the new fermentation processes brought about by bacteria and other microbes. From that dinner he was whisked away by one of his former students, Harold E. Babbitt '11, professor of sanitary engineering at Illinois, and later in the evening was initiated into the local professional sanitary and municipal engineering society known as Mu San. This is an honor which has rarely been bestowed on outsiders and was of course very greatly appreciated. On Monday evening, December 4, the Secretary was a speaker at a large and enthusiastic smoker of the Chicago Alumni, where he described some of the new developments in the various divisions of the Department of Biology and Public Health. The next day he spoke on "The Responsibilities of the Food Manufacturer to the Consumer" before the American Butter Institute at its annual convention, and ended this orgy of addresses by a brief talk on "Epidemics of Food Poisoning" before the local group of food technologists in Chicago. This latter was a particularly interesting meeting as it was also the occasion for the discussion of the program of the first official meeting of the new professional society, the Institute of Food Technologists, of which your humble Secretary has the honor of being the first president. With five addresses to prepare for delivery within one week, it is perhaps not surprising that the January Review was devoid of '94 notes.

While in Chicago, the Secretary called on Arthur Clement at his busy offices in South LaSalle Street. Clemy does not show the effect of years very much, although there are a slight thinning of the hair and a little more tendency toward rotundity than he had in the days that were free from care when we were all at the Institute. He has the same cheerful smile, and it was very delightful to spend a few minutes with him. He happened to be the only '94 man encountered in this visit to Chicago, but a large number of men belonging to younger Classes were met at the smoker. It was pleasant to renew old acquaintances and make new ones.

Ike Hazelton has been selected to paint the portrait of the late Robert Fletcher, the first director of the Thayer School of Civil Engineering at Dartmouth and for many years a very eminent man in his profession and an extremely useful citizen of New Hampshire. A committee of Dartmouth graduates, of which Charles R. Main '09 was one, examined the work of a number of portrait painters and were unanimous in selecting Ike, whose portraits of President Crafts and H. W. Tyler '84 both appealed because they were such excellent likenesses and because of their vitality and the style of execution which Hazelton had put into them. The Class should feel honored that he has been commissioned to do this important portrait which will occupy a prominent position in the new engineering building at Dartmouth.

A few months ago one of the Lynn newspapers gave a brief account of our classmate, William H. Pratt, character-

izing him as one of the foremost inventors employed by the General Electric Company. With a record of seventy-five patents credited to his name, he still carries on work at the West Lynn plant and apparently has not shown any sign of diminishing power or lessening inventive genius. Pratt is a good example of a man who grows up with a business. After graduating in Electrical Engineering he did considerable designing and the following year was engaged by the General Electric Company to work in the meter plant at West Lynn. Here he was brought in contact with Elihu Thomson, who was the original designer of the motor meters constructed by the company. Pratt immediately started work in the meter department. While employed in that department, Pratt made a suggestion, relative to the improvement of the meter, which resulted in his promotion to the engineering department, where he was placed in charge of the laboratory. While in this position he was given the problem of producing an induction watt-hour meter. This was the first of a series of meters designed by Pratt, each of which has been markedly superior to its predecessor, and he probably has more patents on meters than has any other research engineer in the world. His continual aim is further to improve the instruments and make them more adaptable to the problems for which they are used throughout the world. Pratt is a life fellow of the American Institute of Electrical Engineers, is interested in astronomy as a hobby, and also likes foreign languages, several of which he reads with facility. He has been the recipient of medals for his inventions and is recognized as one of the leading authorities in the world on measurement instruments. As might be expected, he has been the author of a great number of technical articles involving mathematics and engineering.

It is with regret that the Secretary reports the death of Charles Henry Cutler, a native of Framingham, who died at his home in Pittsfield, Mass., on December 6. Immediately after graduation, Cutler became associated with the American Telephone and Telegraph Company and thereafter the greater part of his professional life was spent in New York. He retired from the company in 1924 and since that date had made his home in Pittsfield. Throughout his whole seventy years, Cutler was much interested in sports. Although all sports appealed to him, in his later years he became an ardent polo enthusiast and was an almost constant attendant at matches in or near Pittsfield. In his younger days he was a fine tennis player. Cutler is survived by his wife and one brother and one sister. The sympathy of the Class is extended to them.

Rose Standish Hardwick died on December 2. After graduation from Smith College in 1890, she spent two or three years at Technology. At Smith she was a Phi Beta Kappa student, receiving a master's degree there in 1909 and a doctor of philosophy degree from Radcliffe in

1924. Dr. Hardwick had been a teacher practically all her life and in recent years had been psychologist at the New England Home for Little Wanderers. For ten years she served as chief psychologist for the state division of mental hygiene.

Another former member of the Class, Edward Sturgis, who was a special student in Architecture, died at his home in Milton, Mass., on December 10. Sturgis had a very quiet and retiring personality and was never especially concerned with the affairs of the Class. It is, however, with great regret that we take notice of his passing and extend our sympathy to his family. — Notice has been received of the change of address of Mrs. Walter B. Griffin (Marion Mahoney) to 1946 Estes Avenue, Chicago, Ill.

A Christmas greeting from Ray Price gave a bit of information about our globe-flying classmate. In our annual interchange of messages the Secretary had sent two cards, one to his Paris address, the other to Price Ranch near Santa Barbara, Calif. — approximately 7,000 miles apart — in the hope that one of them might reach him before the holiday. Shortly after the Santa Barbara card had been mailed, a card was received from Price from Los Angeles, where he is living for a few weeks at 667 South Hoover Street. Ray says: "We (he and Mrs. Price) caught the last American clipper from Southampton before war started and hurried on to California, but hope to return at least as far as Lisbon in the spring." His Los Angeles address is good until March 1. We hope that he will look up some of his old friends and pay a visit to Technology before he again flies the Atlantic, although to him this flight is no longer a novelty. He does it as unconcernedly as most of us would fly from Boston or New York to Washington. — The Secretary was sorry to miss a visit with Lovejoy at the time of the January meeting of the Institute's Corporation. Bovey, our other life member, was not in Cambridge for this meeting. Henry Warren is a member of the Visiting Committee on the Department of Electrical Engineering, serving as a representative of the Alumni.

It would be extremely helpful if members of the Class would send in news of their doings. Do it now. You are all too modest about yourselves. — SAMUEL C. PRESCOTT, Secretary, Room 3-205, M.I.T., Cambridge, Mass.

1895

Miss Anna Laura Wolfe, daughter of Mrs. Wolfe and the late John Colvin Wolfe, of 273 Wardwell Avenue, Staten Island, was married on January 6 in St. Patrick's Cathedral to Thomas W. Gleason of Staten Island, son of Mr. and Mrs. William Gleason of West Palm Beach, Fla. A small reception took place at the Waldorf-Astoria. Members of the Class will remember Anna pleasantly at the Oyster Harbors reunion and at the get-together at the Gramatan Hotel, Bronxville, N.Y., last June.

George Winthrop Torrey, IX, passed away on December 20. Torrey was with our Class for three years. Leaving Tech-

1895 Continued

nology, he worked for the Church Green Electric Light and Power Company of Boston until 1902 and as special agent with the Edison Electric Illuminating Company of Boston until 1907. From 1907 to 1910 he was partner with T. T. Kelly Electrical Company, Boston. Until recently thereafter, he was located at 133 Summer Street, Boston, as an electrical engineer and contractor.

Arthur D. Dean has left Waterloo, N.H., and is now located in Warner, N.H.; his address is Box 161. — Carl H. Clark, XIII, is still at 79 Milk Street, Boston, Mass. The firm name has been changed recently to Clark-Wichert, Inc. — Donald P. Hart, IV, is still in New York City. You can locate him at his home, 27 East 95th Street. — Announcement has been made recently of a second arrival in the family of Franklin A. Park, Jr., '34, and Lucile Defren Park.

The regular five-year reunion of the Class, the forty-fifth, will be held next June, Saturday and Sunday, June 1 and 2, at the New Ocean House, Swampscott, Mass. The location will provide all the facilities for outdoor as well as indoor recreations, and will be near Boston so that those attending our reunion can easily connect with the Class Day, Alumni Day, and graduation exercises in Cambridge the following Monday and Tuesday, June 3 and 4. Full information and questionnaires will be mailed the members of the Class in due time. We hope to have a large attendance. This will be the opportunity to meet the remaining guard and refresh memories of the early happenings of the past half century. Mark the dates on your calendar. Your Secretary will remind you! — LUTHER K. YODER, *Secretary*, 69 Pleasant Street, Ayer, Mass. JOHN H. GARDINER, *Assistant Secretary*, Graybar Electric Company, 420 Lexington Avenue, New York, N.Y.

1896

On the very day that these notes were being written (January 24), Billy Haseltine made a hurried call at M.I.T. with his son, who was graduated from the Harvard Medical School and is serving in a Boston hospital. There was hardly time to say more than hello and good-by. Billy was on one of his annual trips East to visit New Haven, Boston, and Portland.

A letter from Paul Johnson '98 at Altadena, Calif., has given reminiscences of Walter Coristine and Herman Poppenhusen, with whom Johnson was a fellow roomer in a boardinghouse in the South End when attending M.I.T. Apparently they had some very interesting and enjoyable episodes, and the dropping of paper bags filled with water, which now is practiced from our dormitory windows, dates back to our times at least. A clipping from the Altadena paper made specific mention of the beautiful lighting effect on Captain Johnson's estate at Christmastime, when multicolored lights were festooned from palm tree to palm tree along the driveway and the fountain had beautiful rainbow colors.

In a letter recently written by Alfred Zapf '95 to Mrs. Marion Lewis Chamberlain Lee, he referred to memories of a snapshot taken back in our student days in the School of Architecture, which showed the then Marion Lewis and Ethel Bartholomew '95 seated in a big basket and paddling vigorously with T squares across the old drafting-room floor.

Welles Mortimer Partridge of St. Phillips Society of the Episcopal Church has sent the Secretary a copy of his little pamphlet, entitled, "Did Henry VIII Found the Church of England?" Partridge's conclusion may be summed up in one phrase taken verbatim from his brochure: "No, a thousand times no!" — Lythgoe has sent along a reprint of his interesting article, entitled, "Food Inspection and the Chemist," which originally appeared in the October *Nucleus* and was put on the air by Lythgoe over station WEEI in Boston on September 15. It summarizes some of Lythgoe's work as director of the food and drug division of the Massachusetts Department of Public Health.

A rumor has reached the Secretary that Nathan H. Sanderson is the author of a recently published history of Waltham, but so far this rumor has not been verified. — Edward A. McGonigle is now president of the E. A. McGonigle Construction Company, 725 Lafayette Street, Detroit, Mich., and resides at 312 Aspen Avenue, Birmingham, Mich. — George Stratton has become chief of the construction section of Federal airways of the Civil Aeronautics Authority at 1015 Fourteenth Street, N.W., Washington, D.C. He has his home at 4624 Forty-ninth Street, N.W. — Mike Sturm writes from Chicago but does not say much except that business is rather quiet with him.

Andrew H. Green died on December 29. He had been for many years on his lime plantation at Canefield, Dominica, British West Indies, making occasional trips to the United States and Europe. Further report will be given in a later issue. — Albert J. Wells died on August 29. He was graduated from Course II and had been for many years an engineer in the construction department of the Otis Elevator Company in Chicago. For a year after graduation he stayed on at M.I.T. as assistant in mechanical drawing. Although a graduate, he had not participated actively in Technology or class affairs.

L. Eugene Emerson, VI, who died on December 17, was a member of Sigma Alpha Epsilon Fraternity and the glee club. He kept up his music in later years and classmates will recall his musical entertainment at some of our gatherings. He was also devoted to tennis. He received from Harvard the degrees of A.M. in 1905 and Ph.D. in 1907. He was born, October 3, 1873, in Portland, Maine, the son of Joseph James and Caroline Mary Waymouth Emerson. He married Mary H. A. Fife on July 3, 1907, in Kenora, Canada. There were four children: Mary, Patricia, Ashton, and Eugene. Emerson was assistant in astrophysics at the Smithsonian Institution from 1896 to

1897, with the New England Telephone Company from 1897 to 1900, a student of music from 1900 to 1903, a student of philosophy and psychology at Harvard from 1903 to 1907, teacher at the University of Michigan from 1907 to 1911, psychologist at the Massachusetts General Hospital from 1911, and more recently in charge of the psychological department. He was a member of the Boston Author's Club; American Psychopathological Association, of which he was secretary; American Psychoanalytic Association, Harvard Club, University Club, and the Longwood Cricket Club. He had written some music and was the author of a book on nervousness and various published articles on psychotherapy. He inaugurated the course, "Care of the Patient," at Harvard University some years ago. Emerson formerly appeared at some class gatherings, but in later years the efforts of the Secretary to get him out were met with the plea that he was too busy to get away.

Rear Admiral and Mrs. R. E. Bakenhus announce the engagement of their daughter Miss Dorinda Rogers Bakenhus to Dr. Lyle V. Beck of Philadelphia. Miss Bakenhus, after being graduated from college, obtained her master's degree from Western Reserve University in Cleveland and is director of social service at Hahnemann Hospital. Dr. Beck obtained his degree of doctor of philosophy from the University of Pittsburgh and is instructor in the physiology department at the Hahnemann Medical College. The wedding is set for March 9. — CHARLES E. LOCKE, *Secretary*, Room 8-219, M.I.T., Cambridge, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge, Mass.

1897

The Class has learned with deep regret of the loss of one of its most beloved and honored members, Hugh Kelsea Moore, who passed away on December 18, at the age of sixty-seven, at his home in New Port Richey, Fla. This came as an especial shock in as much as before his departure for Florida, Hugh met with some of his classmates on December 4 at the City Club and enjoyed a social hour with them. He never lost interest in the Class, and it was a genuine pleasure for him to meet as many of the boys as could gather at short notice. His note of appreciation, written on December 4, attested his great pleasure in meeting and chatting with the boys, and it was his intention to entertain them in his usual generous way. The Class is proud to have had among its members a man of such sterling character and outstanding attainments.

The New York *Herald Tribune*, in its issue of December 19, wrote of him thus: "Mr. Moore, chief chemical engineer of the Brown Company, paper manufacturers, of Berlin, N.H., from 1904 until his retirement in 1934, was the holder of fifty patents for processes related to paper and pulp manufacturing and electrochemistry. President of the American Institute of Chemical Engineers in 1925 and 1926, he received the institute's gold

1897 Continued

medal in 1920 for 'the best contributions to applied science since 1913.' Mr. Moore had also been active in politics. He was a Republican member of the New Hampshire Legislature in 1923 and 1924, and was an unsuccessful candidate for the Republican nomination for Governor in 1930. He was born in Andover, Mass., a son of the Rev. Albert Weston Moore, a Congregational minister, and Mrs. Sarah Frances Norton Moore. He was a descendant of James Mohr, who founded the town of Pembroke, N.H., in 1715.

"Mr. Moore attended the Massachusetts Institute of Technology for three years, but for financial reasons was forced to leave in 1896. Soon afterward he organized the Moore Process Company and developed an improved electrolytic cell, designed to make the process of electrolysis a safer and more efficient operation. He eventually gave up this work because of lack of capital and in 1903 took a position as day laborer with the Burgess Sulphite Fiber Company in Berlin, N.H., where he had made the first satisfactory commercial installation of his electrolytic cell in 1899. Among his major achievements were the development of an explosion process for recovering soda salts from 'black liquor,' a by-product of pulp manufacture; the construction of a multiple effect evaporator to recover soda from waste pulp liquor, said to be the largest and most efficient machine of its kind, and the development of a new alkali process for producing caustic soda.

"During the World War Mr. Moore was a member of the chemical engineers' committee of the Council of National Defense, and was treasurer of the New Hampshire branch of the Naval Consulting Board. He visited a number of poison-gas plants as a technical adviser, as the Brown Company was engaged in the manufacture of mustard gas for the Army. Later Mr. Moore was a member of the staff of Brig. Gen. Amos A. Fries, chief of the Chemical Warfare Service, in command of the Chemical Warfare Service plant at the Edgewood, Md., arsenal. Mr. Moore received the honorary degree of Doctor of Science from the University of Maine in 1924 and the Perkin Medal of the Society of Chemical Industry in 1925. Since 1920 he had been a trustee of the National Research Council and . . . chairman of the board of trustees. . . .

"Mr. Moore married Miss Mary Esther Tebbetts, of Lynn, Mass., in 1902. They had three children, Hugh Kelsea Moore, Jr. [32], Mrs. Katherine Burgess Durrell and Miss Dorothy Esther Moore." — Sincere sympathy in their loss is extended to his wife and family by his classmates.

You will all be interested to know that Robert Lunt, who has been with the Du Pont Company for so many years, representing them in Boston, has been called by them to their New York office to take charge of one of their important departments. We are promised more data on this later by Lunt. We extend our congratulations to him on his promotion, but we miss him from our Boston gatherings.

James Timothy Baker passed away on October 27 at the age of sixty-five. He was a native of Adams, Mass., where at one time he conducted a shoe store. Later he operated his own shoe factory in Brooklyn, N.Y. He died at his home, apparently of a heart attack. He had appeared to be as well as usual but was stricken at his office.

Baker was born on October 25, 1874. Two of his sisters, Anna C. and Blanche E. Baker, as well as one brother, Wallace L. Baker, predeceased him. His first employment was as a clerk in a shoe store. . . . Later Baker opened his own shoe store on the Center Street site where the South Adams Savings Bank is now located. He left Adams in the early 1900's to go to Chicago, where he was employed for some time at the Marshall Field store. From Chicago he went to Brooklyn in 1915 to become a manufacturer's shoe salesman. From 1926 to 1934 he operated his own shoe factory in Brooklyn and in recent years was regarded as one of the best-known and most able shoe salesmen in the East. Baker returned each year, with the exception of 1938, to spend a portion of the summer in Adams, where he had numerous friends. He was well known as a singer and baseball pitcher. He was also prominent as a golfer and assisted in the laying out of the golf course for the Forest Park Country Club, of which he was an active member. He was a former member of the First Congregational Church in Adams and of the choir of that church. He was a member of the former Colonial Club of Adams and of the Masons and Shriners in Brooklyn.

He was married in 1905 to Miss Anna Chapell of New London, Conn., who died in 1914. In 1915 he married Miss Mary Helen Cross of Cleveland, Ohio, who survives him as do two daughters, Mrs. Donald Borden of 21 Walter Street, East Hartford, Conn., and Mrs. Helen Clarke of Brooklyn. He also leaves three grandchildren. In the Class, all were his friends, and all will agree that we have lost one of our most beloved and cherished members.

George Wadleigh contributes the following: "Walter Spear, as you probably know, is very busy on the New York water supply, where something over two hundred million dollars must be spent before the additional Delaware water can be brought into the present system. The New York water supply now is a matter of some concern, for at the present rate of consumption, there is only about 100 days' usage left, with very little snow on the hills to help fill up the reservoirs in case of a thaw.

"A hasty call was paid me not long ago by Hunnewell, whom I have seen but once since graduation. I did not know him at first, but it did not take long to get together on old times. He is at present, as he has been for a number of years, in charge of all design of new construction for the Coast Guard. As the Coast Guard is larger than our whole Navy of fifty years ago, his is a very sizable undertaking. George Lawler comes in now and

then in connection with electrical problems at our mill, which he ably passes on to the benefit of the Associated Factory Mutual Fire Insurance Company and ourselves." — Thank you, George Wadleigh. Keep up the good work.

The death of Edward H. Prichard comes as a great shock to his classmates who knew him well. He was born in Cincinnati, Ohio, and passed away, at the age of sixty-eight, on November 5 while visiting at East Gloucester. He was a prominent and well-known architect of Boston, having offices at 234 Boylston Street. He designed many fine residences in Boston, Brookline, Marblehead, Marion, Tarrytown, N.Y., and Santa Barbara, Calif. He belonged to the Boston Architectural Club, the City Club, and the Boston Art Club. Prichard never married and had no close relatives. His friends were legion, however, and they deeply feel his loss. He was an outstanding member of the Class, and we regret his passing. — JOHN A. COLLINS, JR., *Secretary*, 20 Quincy Street, Lawrence, Mass. CHARLES W. BRADLEE, *Acting Secretary*, 30 Kilby Street, Boston, Mass.

1898

Roger Babson has pronounced opinions on many matters and is never afraid to express them. In the January issue we mentioned some of his efforts at reform in local matters — church government, public school education. Today we quote from a letter, written last October, which shows that his interests concern the welfare of the world: "You probably know I have been in Japan and China most of the summer and have just returned. I am convinced of one thing, namely, Chiang Kai-Shek is fighting our battles for us, and the United States government should help him with some small credits. If he could be assured of \$2,000,000 in gold per month, he could eventually drive the Japanese out of China."

Paul Johnson called our attention to the 1877 class notes in the January issue of *The Review*. The notes consisted of a diary of Francis H. Bacon of that Class, who is in Greece and concerns himself with ancient art and architecture. Mr. Bacon had run into our classmate Gorham P. Stevens on several occasions and found a community of interest with him.

Ed Chapin is more than busy these days. The dyestuff situation is not acute now as it was in the years following 1914 when we were largely dependent on Germany for dyes. It will be remembered that following the World War, Ed occupied an important international post in the distribution of dyes.

We feel a particular sense of loss when one of our classmates, still in perfectly robust health and actively carrying on with a distinguished career, is taken from us by an accident. Tom Tallmadge was killed in the wreck on the Illinois Central railroad on January 1. We quote the following from the *Chicago Tribune* of January 2: "Thomas Eddy Tallmadge . . . was one of America's most widely known architects. He was 63 years old. Mr. Tallmadge . . . was considered one of the

1898 Continued

greatest teachers and historians of architecture. His major interest in design was Gothic, and with his former partner, Vernon Watson, he became widely known for his construction of churches. . . .

"His 'The Story of Architecture in America,' first published in 1927, is considered one of the best studies of the subject. In 1935 he published 'The Story of English Architecture,' and he had been working recently on 'The History of Chicago Architecture in Chicago' in his studio at 19 East Pearson Street. Mr. Tallmadge was a member of the advisory committee of architects that supervised restoration of Williamsburg, Va. For many years he lectured on architectural history at the Art Institute. During the summers he supervised the Art Institute's summer school of painting which used his 100 acre tract at Saugatuck, Mich.

"Mr. Tallmadge was born in Washington, D.C. . . . [He] recently became associated with William Alderman. During the World War he was architect in chief of the Victory Loan decorations here. He designed the Colonial Village at A Century of Progress, 1934, and was one of the architects for the federal north side housing project in 1935. Mr. Tallmadge was a member of the art commission of Evanston, where he lived in the Homestead hotel with his sister, Miss Abbey Tallmadge. He never married." — ARTHUR A. BLANCHARD, *Secretary*, Room 4-160, M.I.T., Cambridge, Mass.

1899

Only one of the members of the Class has written me of his last summer journeyings — and now the winter hegiras are under way. Frederick C. Waddell of Bethlehem, Pa., was reminded of his delinquency by my comments in the January issue of *The Review*. He and Mrs. Waddell made the trip to which I there alluded, and their first visits were to Gettysburg, Pa., and Frederick, Md. He even tried to call on me but had no better luck than he had had in 1938 when he journeyed South, searching as he went for '99 men and missing connections by 100 per cent. Westward, though, in Tennessee, his luck began to change. At a mountain school near Newport, he chatted with a teacher whose home is "just around the corner" from that of C. Gardner Barry in Sandwich, Mass. At Berea, Ky., he visited the Churchill Weavers and, incidentally, D. C. Churchill, who was so deeply immersed in his research problems that he just couldn't remember where he had seen Waddell. As they had met at the reunion in June at Manchester, Mass., it did not take long to iron out that little difficulty, and thereupon they spent an interesting afternoon going over Churchill's plant which, by the way, I have seen myself; it is indeed well worth visiting. If you want fine heirlooms for your grandchildren, the fabrics of the Churchill Weavers are the thing, says Waddell.

From Berea his party journeyed to Lincoln's birthplace in Kentucky and then to his tomb at Springfield, Ill. They did not, however, go to reconstructed New Salem. — Circling back via Dayton, Ohio, they

called on a member of the Class of '96 who builds big dams; thence to Cleveland where the Waddells started housekeeping thirty-eight years ago; and back by easy stages to Bethlehem — a matter of some 4,000 miles in all. Not far, this, says F. C., but as he's a bit lazy (his own expression) and does all the driving, he tries to limit his journeys.

Norman Rood wrote me that he still lives at The Meadows, Wilmington, Del., notwithstanding the fact that some one reported that he had moved to Terre Haute, Ind. Just now he is "somewhere in Florida," at a nice quiet little place near Venice, on the west coast, where he expects to eat, sleep, and go fishing. He will doubtless have stories of fish, ere this column appears in print. Perhaps I'll get a fish story from him.

In the "Yeas and Nays" column of the *United States News*, Washington, D.C., I found a pithy comment by our own Arthur B. Foote of Grass Valley, Calif., on the alleged wastefulness of labor policies, which I quote: "On the Pacific Coast the losses from strikes to shipping and shippers amount to hundreds of millions. The railways have not suffered from strikes, but because wages are higher than ever before, and far above the value of the service performed, they are bankrupt and freight rates higher than the traffic will bear. In the building trades, merchant marine and coal mines, wages are maintained by monopolistic methods far above the value of the production as determined by supply and demand." As a result, he finds "these industries are at a low ebb affording little opportunity for employment," and he concludes: "This nation has prospered heretofore because each person has been free to earn as much or as little as he was willing or able to do. Thus personal ambition and initiative were stimulated, resulting in maximum production and prosperity. But when the right to work is limited to members of a designated organization, when jobs are awarded according to rules instead of merit, when those unable to earn a stipulated amount in a given time cannot legally be employed, it means the end of freedom. . . ."

I am happy to return to our active list the name of Charles R. Greenlaw, who is with the Pacific Telephone and Telegraph Company, 140 New Montgomery Street, San Francisco, Calif. It is a long time since I have had a record of his whereabouts — 1920 in fact. — Robert P. Anderson, of Stamford, Conn., is now with Yale and Towne Manufacturing Company, 4530 Tacony Street, Philadelphia, Pa. — Ross Hasbrouck is with the Centrifilter Corporation, 452 Fifth Avenue, New York City, and Dwight Farnum can be found at 2017 Woodruff Avenue, Temple City, Calif. — W. MALCOLM CORSE, *Secretary*, 1901 Wyoming Avenue, N.W., Washington, D.C. ARTHUR H. BROWN, *Assistant Secretary*, 53 State Street, Boston, Mass.

1900

The midwinter alumni dinner and lecture at the Institute on January 10 brought out a fair showing of the Class;

among those noticed were Cutting, Walworth, Fitch, Allen, Russell, Newhall, and the Secretary. — We had a very pleasant visit from Jackson the other day. He looks the picture of health, and a bit of outdoor life seems to agree with him.

Gallagher, VI, has moved to 205 Maple Street, Florence, Mass.; Hanson, II, is now living at 119 Magnolia Street, Dorchester, Mass. — Clint Thurber has left Meredith, N.H., temporarily for a winter sojourn in Clearwater, Fla. — Uncle Sam was good to this column recently, bringing a letter from Woodward of the Woodward Iron Company in Alabama. The substance is being whipped into shape for another issue. A picture was enclosed, and it is the same old boy all over again.

Speaking of pictures, who should be peering out of the Boston *Herald* columns on January 5 but our own Stanley Fitch. The article said: "The oath of office was administered yesterday by Lt. Gov. Cahill to Stanley G. H. Fitch of 50 Garden street, Cambridge, as a member of the board of registration of certified public accountants. Fitch is a member of the firm of Patterson, Teele and Dennis, Boston, past president of Massachusetts Society of Certified Public Accountants, past president of Boston chapter, National Association of Cost Accountants; former vice-president and at present a member of council of the American Institute of Accountants; . . . a member of the council of the Alumni Association of the Massachusetts Institute of Technology, and vice president of the Episcopalian Club of Boston, Mass." This is another example of the high caliber of recent appointments made by Governor Saltonstall. The choice of Fitch, who is highly respected in his profession and well loved by his many friends, is gratifying to the followers of gubernatorial news.

William G. Pigeon, IV, died on December 22 in California. The Boston *Globe* had the following notice: "William G. Pigeon, 60, a native of East Boston, died yesterday at his home in Piedmont, California. . . . He . . . had been engaged in architecture in San Francisco for 30 years. He leaves a son, Gardner Pigeon of Piedmont; a brother, Richard Pigeon of Wellesley Hills, and two sisters, Mrs. Anna P. Niles and Mrs. Adele J. Loud of Belmont. . . ." — Professor Locke '96 says that Daniel S. Johnson, who makes his headquarters in Tonopah, Nev., was engaged during last summer in modernizing the mill of the Curley-Luck Gold Corporation near Denio, Ore., and late in the fall was engaged on mine examination work in Idaho. — Letters about the fortieth reunion in June are going out now to the entire Class. If you have not already answered, please do so at once. — C. BURTON COTTING, *Secretary*, 111 Devonshire Street, Boston, Mass.

1901

The Editors of *The Review* have been so generous in allowing the Class Secretaries all the space desired for the class

Come Back to Tech on June 3 — Alumni Day

1901 Continued

notes that some of us may have become so enthusiastic in quoting news items that more space has been used than was fairly our share. This particular installment will, therefore, be comparatively short, but your Secretary does wish to make reference to a chance encounter in the smoking compartment of a Pullman car with a fellow passenger who made very enthusiastic comments on what he referred to as the "wonderful plant of the Eastman Kodak Company" located in the "remarkable town of Kingsport, Tennessee." I was so much interested in the comments made by the gentleman that I wrote to our loyal classmate, Al Sulzer, Vice-President of the Eastman Kodak Company at Rochester, N.Y., and he has sent me several descriptive booklets and a copy of a very interesting article which appeared in the June 10, 1935, news edition of *Industrial and Engineering Chemistry* (volume 13, page 247). The booklets Al sent were also most interestingly prepared and in addition to making reference to the Tennessee Eastman Corporation at Kingsport, included some very interesting information regarding Kodak Park at Rochester. The article from *Industrial and Engineering Chemistry*, however, gave a very interesting description of the plant of the Tennessee Eastman Corporation and described how that division of the company had, in a comparatively short time and in the face of the depression, developed into a cellulose acetate plant supplying the needs of the largest photographic industry; had also become by then the second largest manufacturer of America's acetate yarn; and, finally, had become a pioneer in the rapidly growing field of acetate plastics. Your Secretary wishes that there were space to quote further from the article and believes that it is so worth reading that if you do not have access to *Industrial and Engineering Chemistry*, Al Sulzer would probably be glad to furnish a copy thereof and very likely would also be glad to send copies of the booklets to which reference has been made. At the plant in Rochester, there are now some 12,000 employees and at Kingsport there are approximately 4,200 more. Elsewhere in this country and abroad the Eastman Kodak Company employs many more, and the photographic and chemical industries of this country have every reason to give the maximum of credit to our classmates, Al Sulzer, Vice-President of the Eastman Kodak Company, and Charlie Flint, who is general manager of the Kodak Park Works. We again express the hope that they may both be with us at our fortieth reunion.

Your Secretary wishes to make special note of the fact that Joe Evans, Vice-President of the Class, recently finished his work for the P.W.A. in Omaha, Neb., and then spent a short time with the P.W.A. in Puerto Rico; however, he has now returned to New York and your Secretary is certain that Joe would be glad to have any of the fellows who happen to be in that city phone him (Whitehall 4-2616) and arrange for a visit at his present office address, 2 Rector Street, New York City. — We also wish

to make additional comment on an item which appeared in the January class notes regarding Charlie Tufts, Vice-President of the Allied Chemical and Dye Corporation. While Charlie's official business address is at 61 Broadway, New York City, he continues to maintain the home which for thirty years he and his wife have found so pleasant in Syracuse, N.Y. Tufts tells me that although his children have all grown up and left the home nest, he and his wife still enjoy keeping the Syracuse residence and that they spend as much time there as possible when business does not necessitate Charlie's presence in New York City. We hope that he will find time to be with us at the fortieth.

Belated notice has just been received from the Alumni Office that Volney E. Lacy, XIII, died on August 25, 1938. This is our first news of Lacy's death, and we trust that some one of our classmates can furnish additional particulars. According to our last information, Volney was president of the Rochester Boat Corporation, Charlotte Station, Rochester, N.Y., and formerly made his residence at 6 Leander Road, Rochester. The Alumni Office also gives the following changes of address: P. Freeman Goodwin, United States Veterans Administration, Washington, D.C.; Harry A. Hodgdon, 122 Sherman Street, Wollaston, Mass.; and William I. Sturtevant, 24 Lowden Street, Pawtucket, R.I. — ROGER W. WIGHT, *Secretary*, The Travelers Fire Insurance Company, 700 Main Street, Hartford, Conn. WILLARD W. DOW, C.P.A., *Assistant Secretary*, 20 Beacon Street, Boston, Mass.

1902

Montgomery has moved his office to 744 Broad Street, Newark, N.J. — McCarthy, now a full colonel, can be reached at War Department Armory, Armory Drive, Trenton, N.J. — Waldo Comins is now located at Texarkana, Texas. — Jimmie Smith is still in Boston, but with Paine Webber and Company at 24 Federal Street.

At the midwinter meeting of the Greater Boston Alumni, January 10, '02 was represented by Galaher, Haskell, Patch, Porter, Philbrick (B. G.), Hunter, and his son, David. — The reports which The Review has printed of meetings of the Washington Society of the M.I.T. reveal that Paul Weeks, Kern, and Marsh are often present at those gatherings.

Paul Hooker, who was associated with the Hooker Electrochemical Company at Niagara Falls, N.Y., died on January 12. He was not well known to the Class as a whole since his attendance at Tech was of very short duration. But his loyalty to the Institute was strong and he took an active part in alumni affairs wherever he was located, serving as secretary of the Technology Club of Central Pennsylvania in the early days. — Paul Hansen's firm, Greeley and Hansen of Chicago, has been chosen to draw up preliminary plans for the sewage disposal project of Metropolitan Boston. — BURTON G. PHILBRICK, *Secretary*, 246 Stuart Street, Boston, Mass.

THE TECHNOLOGY REVIEW

1904

Our classmate, James S. Currier, died on November 25, and the following from the Newport *Mercury and News* of December 1 contains much of interest: "James Swasey Currier, 57, ordnance engineer of the Naval Torpedo Station for 30 years and prominent in local yachting circles, died . . . at the Newport Hospital after a brief illness. Apparently in good health, he was stricken . . . at his home on Prairie avenue, and taken to the hospital.

"Mr. Currier, who was one time commodore of the Newport Yacht Club and retained his interest in small boating for many years, was born in Newburyport, Mass. He came to Newport in November, 1908, and has made his home here continuously since. He was regarded as an expert in ordnance engineering, an important step in the manufacture of torpedoes. . . . He was a charter member of the Ida Lewis Yacht Club and until recently, an active member of the Miantonomi Club. He belonged to St. Paul's Lodge, No. 14, F. and A.M.; Newport Chapter, No. 2, Royal Arch Masons, and DeBlois Council, Royal and Select Masters. Surviving are his wife, Mrs. Alice (Thompson) Currier, a former member of the School Committee; two daughters, Mrs. Charles A. Stokes of Cambridge, Mass., and Miss Carolyn D. Currier of Boston; a son, James S. Currier, Jr., a student at Brown University; and three brothers, Rowland Currier of Newburyport, Winthrop Currier of Salisbury, Mass., and Ralph Currier of Decatur, Ga. . . ."

A Christmas card from Bill Eager had the following message on the back: "My business address after January 1 will be Treasurer, the R. W. Cramer Company, Inc., Centerbrook, Conn. Haven't got a place to live yet, but probably will be in near-by Essex, Old Lyme, or maybe Saybrook. Anyhow, near enough to Boston now to see you guys once in a while."

A letter arrived recently from Mert Emerson, giving the following information: "A note has come from Reg Wentworth, saying that he is now vice-president and general manager of Wallace Clark and Company, 15 Broad Street, New York City; in other words, he has left the Calco Corporation at Bound Brook, N.J. I think you will recall Clark by reputation at least. He is, I suppose, the best-known American consulting engineer in Europe and has offices in London, Paris, and other foreign cities. He was an associate of H. L. Gantt, and I think Reg met him when they were working together years ago at the Remington Typewriter Company." — That's all the notes there are this time. Perhaps if something happens to the New Deal, there may be more in the future. — HENRY W. STEVENS, *Secretary*, 12 Garrison Street, Chestnut Hill, Mass. AMASA M. HOLCOMBE, *Assistant Secretary*, 4817 Woodway Lane, N.W., Washington, D.C.

1905

Twice your Secretary has made a grievous mistake by stating in this column that our thirty-fifth reunion would

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take place on June 7, 8, and 9. That is an error. Alumni Day, it has been decided, will be celebrated on Monday, June 3. Therefore, by custom as well as by vote at the reunion last June, our thirty-fifth will be held on May 31, June 1, and 2. The committee appointed to appoint committees to run the reunion decided that the Class really wanted a dictator and that the Secretary should continue to act as such. However, they did sit down together long enough to decide that the reunion should be held at Old Lyme, that a quota for attendance attainment should be set at 100, and that each member, when called upon for help by the dictator, should respond to the service required. The first letter-announcement is already in your hands, and early returns indicate that the quota which has been set will be reached.

Would that we could use pictures and all of a page of the Boston Sunday Post of December 10, for it contained a full-page story of Harry Atwood, II, our old boy aviator. We quote, briefly, however: "Just short of 20 years ago, Harry Atwood . . . accompanied by a United States Navy observer, took a nose dive in a seaplane clean under the waters of Pimlico Sound, on the North Carolina coast. Atwood, who holds more 'firsts' in early day aviation than any other flier, had built the queer looking seaplane that was the main offender in the crash in a little less than a month, with the help of a navy crew. It was a pusher type biplane, mounted on a float fuselage, with cockpit for pilot and two passengers. A strange appearing craft, but the darn thing flew. The aviator went into that nose dive with little save hope in his heart, came out with ideas which built up into the present interest in the so-called plastic airplane, a ship of the air with fuselage and wings made of wood and modern plastics instead of metal."

The rest of the story concerns the later evolution of the plastic airplane. "That will be his contribution to this constantly swifter moving, streamlined modern world. What does he want for himself? Well, he's building the precursor of that right now; the first of a series that he hopes eventually to develop into an entirely new sort of an airplane, one that will fly higher than man has ever dreamed of going, that will withstand the terrific interior pressure that will be necessary to sustain human life in the upper stretches of the stratosphere. . . . Now Harry Atwood is having his third plastic plane built. It will be 24 feet long from nose to tail, have a four-seat cabin eight by five feet and will carry a 150-horsepower engine. The assembled plane, complete with engine, will weigh less than 1000 pounds, have a speed in excess of 200 miles per hour. It is sealed with a special rubber coating that will make it absolutely airtight; it will be strong enough to stand the interior pressure that will be necessary even if it goes out into space. . . . It appears that Harry Atwood may soon see come true his dream of skies full of lighter, cheaper, safer airplanes, made from wood strips and plastic."

Apparently we have an '05 Ed Wynn. A recent newspaper report of a \$10,000 fire in a house in Cohasset, Mass., gave great credit for the prevention of a conflagration to Chief Gilbert S. Tower, XIII. You'll have to suspend all fires from May 31 to June 3, Gib. — From Mrs. Ed Burkhardt we learn that Burk has been critically ill with heart trouble for nearly two months. Recent reports from the hospital are not too encouraging. Here's hoping he may fully recover and be at Old Lyme next June, bringing what he used to bring. — Through Lloyd T. Buell, III, of Bisbee, Ariz., we obtained a newspaper clipping in regard to the death on November 21 of George G. Wald, III: "George G. Wald, mining engineer and chief metallurgist at the Arizona Magma mine at Chloride, died suddenly of a heart attack . . . at his home. Mr. Wald came to Chloride some four years ago and associated himself with the operations of the Magma mine and mill. Wald was born in Boston, Mass., April 28, 1883 . . . and . . . came west to Utah with Louis Cates ['02]. He later spent several years in Ray, Arizona, where he did geological and technical engineering work. He was secretary of the Chloride council of the Arizona Small Mine Operators Association and one of its most active spirits. In 1917 he married Miss Edith Carpenter, sister of Cliff Carpenter, manager of the Arizona Magma company. . . . To the marriage were born three sons, George, connected with a Los Angeles aircraft manufacturer; Edwin, assayer at the Magma mine and mill, and Karl, a junior in the Mohave county union high school. The body was shipped to Pasadena . . . to be cremated."

Ward P. Delano, IV, of the architectural firm of Fuller and Delano, was found dead from a self-inflicted bullet wound in his head on the morning of January 10 in his office at 44 Front Street, Worcester, Mass. Business friends and those nearest him were unable to ascribe a logical cause for his action. Delano was graduated with us and had devoted himself diligently to his business, which was one of the largest in architectural circles in Worcester. Apparently he never married, his next of kin being a sister and aunt. — FRED W. GOLDTHWAIT, Secretary, 274 Franklin Street, Boston, Mass. SIDNEY T. STRICKLAND, Assistant Secretary, 75 State Street, Boston, Mass.

1906

In the January notes reference was made to Andy Kerr who lives in Barnstable on Cape Cod. Later information permits us to give additional details of his numerous business and organization activities. Andy is the senior partner of the Andrew Kerr Company, packers of canned clams and bouillon and also the only packers of Red Squill rat bait in the world, having canned enough the last year to kill twenty million rats. Andy is consulting canning expert for the United States Biological Survey; President of the Cape Cod Farm Bureau; commander of the United States Spanish War Veterans; chairman of the committee of public health, Massachu-

setts Farm Bureau Federation; member of the National Health Conference; and so on; and so on. All this to show that when we stated that Andy was a very busy man, we meant it.

We received a letter in late December from George Burpee, who is one of the members of the firm of Coverdale and Colpitts, consulting engineers at 120 Wall Street, New York. George writes: "While this sounds a great deal like tooting one's own horn, I have overcome my natural reticence sufficiently to send a copy of the *Whispering Pines* of September, 1939, which contains a notice . . . which may be of some passing interest to our classmates." This extract from the *Whispering Pines* is the citation which accompanied presentation of the degree of doctor of science, awarded George by Bowdoin College, Brunswick, Maine, at commencement last June: "George William Burpee, of the Class of 1904, of New York City, Bachelor of Science of the Massachusetts Institute of Technology; civil engineer, distinguished in his profession not only because of notable service in construction of one of the largest chemical plants during the World War at Muscle Shoals, but because as a member of one of the nation's leading engineering firms . . . he has kept abreast of all modern movements in that field; an admirable example of the fact that the possession of a liberal education does not necessarily prevent one from rising to distinction in engineering and highly technical work; a public spirited citizen who has given to education and to charities in his community; Canadian born, American bred son of Bowdoin whose father was a distinguished engineer in the early days of railroading in Northern Maine and whose mother is known all over the state for her public spirit and interest, who has taken to the complex problems of a metropolitan career something of the straightforwardness, energy and freshness of the Aroostook." — Congratulations, George, and thanks very much for overcoming your "natural reticence" and submitting this most important item for the notes.

The Secretary regretted his inability to attend the midwinter alumni meeting which was held at Walker Memorial on January 10. At that time, Boston was enjoying the first run of "Gone with the Wind," and since a family theater party had been arranged for the tenth, the attendance at the midwinter meeting was out of the question. The Class was represented by Assistant Secretary Rowe, T. L. Hinckley, and Cupid Nash. — The Secretary acknowledges the receipt of a post card from Abe Sherman, postmarked Sarasota, Fla., January 16. Abe and Mrs. Sherman left January 10 and intend to stay for a month or two. This is the complete report of the Florida exodus to date. In accordance with past custom, several other members of the Class will probably be vacationing in the sunshine state before the season is over. — Acknowledgment is likewise made of the New Year's greeting card from Fay, Spofford and Thorndike sent by Carroll A. Farwell,

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1906 Continued

who is one of the partners in this Boston consulting engineering firm. — JAMES W. KIDDER, *Secretary*, Room 802, 50 Oliver Street, Boston, Mass. EDWARD B. ROWE, *Assistant Secretary*, 11 Cushing Road, Wellesley Hills, Mass.

1907

Early in January came a letter, accompanied by a class statistics sheet, from John Frederick Johnston, Jr., I. This was especially welcome, as it gave the first complete information received from John since 1907. For ten years after graduation he had various jobs with several engineers and contractors, from timekeeper to construction superintendent. In 1917, he became industrial relations manager with the Union Construction Company, a large shipbuilding firm at Oakland, Calif. He was efficiency engineer and assistant manager for a large food products firm on the Pacific Coast from 1920 to 1924, when he became sales engineer and merchandising manager for Associated Oil Company, large oil refiners in California. Since December, 1935, he has been civil engineer with the United States Department of Agriculture and is now in charge of flood control in California and Nevada, with the Soil Conservation Service, under authority of the Omnibus Flood Control Act of 1936. During the years, he has had occasion to speak officially before many organizations, to do some radio broadcasting, and to give a course in industrial relations one summer at the University of California. His office is at 2223 Fulton Street, Berkeley, Calif., and his home is at 935 Regal Road in the same city. Married in 1911, John and his wife have four daughters. Two of them are married, and each has a baby boy. The second oldest daughter is in Italy, having been at Munich until the war situation forced her away. For three years she has been studying voice and musical composition, expects to sing in opera this spring, and is due to receive her Ph.D. in music in May (provided the University of Munich is still in business).

A clipping from the Boston *Herald* of January 11 says: "A portrait of the late Prof. Henry B. Alvord of Northeastern University's college of engineering was presented to the school yesterday, as a feature of the convocation exercises held in Jordan Hall. . . . Henry, our classmate, died last April 20."

At a tea in Lewiston, Maine, on December 19, announcement was made of the engagement of Elizabeth MacGregor, daughter of our Milton E. MacGregor of Needham, Mass., and a senior at Bates College, to Charles W. Crooker, captain of the Bates football team. Elizabeth has made the dean's list at the college consistently, is active in musical affairs, and is assistant dancing instructor. Crooker plans to attend Yale Divinity School next year. — Albert F. Bancroft, President of Bancroft Walker Company, shoe manufacturers, is now living at 40 Pickwick Road, West Newton, Mass., with his daughter and her husband, his wife having died in February, 1939. — A new address for Harold S. Duncan is

Post Office Box 1589, Prescott, Ariz. I do not know the facts about his present business connection. — We received in January an attractive and informative calendar prepared by the bureau of safety of the Anaconda Copper Mining Company and sent by our classmate Albert E. Wiggins, manager of Anaconda's reduction departments at Great Falls, Mont. This public appreciation will supplement my personal thanks already expressed to Albert.

On January 9, I had just left an office in a large building in Boston and started along the corridor when I was surprised by hearing someone calling my first name. On turning around, who should I see coming toward me but Bob Thayer, who not only is an '07 man but also a former high-school friend whom I had not seen for many years, although his business and home are no farther away than New York City. Since 1911 he has been editor and business manager for several railway trade publications published by Simmons-Boardman Publishing Company, 30 Church Street, New York City. He has one son, married and living in Cambridge, Mass., working for the McGraw-Hill Publishing Company, Inc. — Hud Hastings, professor of industrial administration at Yale, spent two months last summer doing editorial work for the National Industrial Conference Board and also began to write for them a pamphlet entitled, "Government and Wages," which he hopes to finish this spring. — A card from Frank MacGregor, postmarked January 6 at Houston, Texas, said that he was to leave there soon afterward for Florida, where he planned to do some fishing on the east coast.

A note from John E. Tresnon in early January gave little news regarding himself but spoke highly of the work that Sam Coupal is doing in organizing and advancing the interests of the small-mine operators in Arizona, thus confirming a similar report from Carl Trauerman as published in a previous issue of *The Review*. Tresnon is lead dispatcher at the Phoenix switching station of the Salt River Valley Water Users Association. His address is Box 828, Route 4, Phoenix, Ariz. A brief letter from Sam Coupal in January told of his enjoyment of his work and of his making a trip East over the Christmas holidays, during which he called on John A. Davis, chief engineer of the information division, United States Bureau of Mines at Washington, with whom he had been having some correspondence on business matters.

Jim Barker has retired from active service as treasurer and vice-president of Sears Roebuck and Company. He will remain as an officer and director of the company until April and after that time will continue as a director, but he will have leisure to travel and do many other things that have been impossible while he has had major corporation responsibilities on his shoulders. Our united and cordial congratulations to you, Jim!

On January 15 the usual midwinter dinner of '07 men in the vicinity of Boston was held in the Silver Room at

Walker Memorial. Nineteen men were present: Laurie Allen, Dick Ashenden, Lester Brock, Howard Chase from Providence, Bill Coffin, George Crane, Tom Gould, Ed Lee, Alex Macomber, Bryant Nichols, Prescott Nichols, Peabo Peabody, Bob Rand, Don Robbins, Gilbert Small, Oscar Starkweather, Stanley Wires, Harold Wonson, and Bill Woodward. The latter, as the informal speaker of the evening, told of the experimental work he has been doing for the past two and a half years at his greenhouse in South Yarmouth, Mass., in growing plants in chemical solution without soil. To say that his talk was interesting would be trite; that it was informing would be commonplace. It was a fascinating story of the wonderful way in which plant life will respond to the proper kind of nourishment and care, giving marketable results of a quality hitherto unknown. The close attention and numerous questions of the fellows indicated the appeal of Bill's experiences and knowledge.

In the Boston *Herald* of January 17, just as I was completing these notes, I happened to see an item telling of the death of Walter B. Gonder, who was president of Gonder, Kelly and Company, dealers in investment securities, at 52 William Street, New York City. I will try to have more particulars in the next Review. — BRYANT NICHOLS, *Secretary*, 126 Charles Street, Auburndale, Mass. HAROLD S. WONSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

1908

The following members of the Class were present at the midwinter alumni meeting on January 10: George Belcher, George Freethy, Winch Heath, Henry Damon, and Cookie. — Bill Booth was installed as worshipful master of St. Alban's lodge, Ancient Free and Accepted Masons, at Foxboro, Mass., on December 11.

We were interested to receive the annual statement of the Dubuque Bank and Trust Company, Dubuque, Iowa, of which Jim Burch, Jr., is president. The bank seems to be in healthy condition. — We report with regret the deaths of the following classmates: Henry W. Shalling, on November 11; Chester S. Colson, on December 5; and Charles L. Pitkin, on December 17.

The following changes of address are reported: Otho L. Golder, 75 Central Street, Ipswich, Mass.; Walter F. Hudson, 28 Oxford Road, New Hartford, N.Y.; George C. Mason, 136 Greenbrier Avenue, Hampton, Va.; John J. Mullen, 2301 Sunset Boulevard, Lakewood, Colo.; and John R. Reyburn, 253 Old Post Road, Fairfield, Conn. — Wouldn't you like to see your name in print? Why don't you write us a letter? — H. LESTON CARTER, *Secretary*, 60 Battery March Street, Boston, Mass.

1909

Through Ned Howe I learned for the first time about the United States Power Squadrons, an association composed of

1909 Continued

yachtsmen and other persons interested in boating. The purpose of this organization "shall be to establish a high standard of skill in the handling and navigation of yachts, to encourage the study of the science of navigation, to co-operate with the agencies of the United States Government charged with the enforcement of the laws and regulations relating to navigation and to stimulate interest in activities which will tend to the upbuilding of our Merchant Marine and our Navy." The organization has now been carrying on its work for about twenty-six years and has upwards of five thousand members, organized into local squadron units reaching from coast to coast and from the Great Lakes to the Gulf of Mexico. One of our mariners from New York, Lewis H. Johnson, has been active in this work and is the new commander of the New York Power Squadron.

In a recent New York *Sun* we saw that Ridsdale Ellis has been elected vice-commander of the Port Washington Yacht Club. — CHARLES R. MAIN, *Secretary*, 201 Devonshire Street, Boston, Mass. *Assistant Secretaries*: PAUL M. WISWALL, MAURICE R. SCHARFF, New York; GEORGE E. WALLIS, Chicago.

1910

At the midwinter Technology get-together for Alumni in the vicinity of Boston, the following classmates were present: Charlie Greene, Dean Peabody, Harry Hale, Abbott Allen, and your Secretary. The meeting was a real get-together and was thoroughly enjoyed. Dud Clapp was unable to be present because he was delivering a talk on "The Pricing in the Chemical Industry" before the Tufts economic club.

Stuart Chase was the speaker at the Newton Forum early in January. His topic was "Unemployment, the Reasons and Remedy for the Same." He built up a very fine line of reasoning and provided his audience with much food for thought. — Dan Gibbs is with Gropius and Breuer, architects, in Cambridge. — Your Secretary is now making preliminary arrangements for the thirtieth class reunion this June. Notices undoubtedly will have been received before this is published. If anyone has failed to receive his notice before reading this, please advise your Secretary. — HERBERT S. CLEVERDON, *Secretary*, 46 Cornhill, Boston, Mass.

1911

A fine time was had by all at the buffet supper and smoker of Greater Boston Alumni, at Walker Memorial on the evening of January 10. It was a particular pleasure for me to be able to get down from Worcester to lead the cheers, for there were eight '11 men present: Coupal, Cumings, Dension, Dyer, Ell, Jenks, Omansky, and Whitcomb.

Art Coupal, II, told us he had been with the Watertown arsenal for about a year as senior gage designer and that things are humming there now. Sterling Dyer, II, said that he is still a railroad man (Boston and Maine) and that his duties keep him away from Boston quite a bit.

Morris Omansky, V, starting in mid-January, is repeating his university extension course, "The Practical Compounding of Rubber," here in Worcester, having given it in Boston last fall.

Ed Moreland '07 told us he had seen Ted Parker, I, who was in Boston on a flying trip just one day earlier in the month. He said Tunnie still looked fit and fine and that he was most enthusiastic about his Tennessee Valley Authority duties in Knoxville. — Carl Ell, XI, President-elect of Northeastern University, told of the formation this past year of a bureau of business research, an organization within the college of business administration. The general policies are to conduct research into the problems of New England business — a fine forward step in which Carl undoubtedly had an active hand.

All of us must have felt a real pang of sadness when we heard in late December of the death of Henry Greenleaf Pearson, for more than a quarter of a century on the English Department Faculty and Head of the Department since 1919 — truly one of nature's gentlemen.

As always it was pleasing to receive so many Christmas greetings from classmates. Although operating from Buffalo and Boston, respectively, Carl Richmond, I, and O. W. Stewart, I, each had a clever family card with rhymes so formed that the first letter of each line spelled out in a vertical line the initials and family name. The three Don Stevens youngsters in a bathing-beach group made an attractive motif, while the Nat Seeley family card was particularly fine this year with a musical touch through a guitar and uke held by the two larger boys in the Seeley quartet of young folk.

A most welcome letter came just before Christmas from Mary Barker, Charlie's widow, who finally had the last of her plaster casts removed the day after Thanksgiving. She was terribly injured, you remember, in the crash on March 15, 1939, that resulted in Charlie's death. She enclosed some snaps taken last winter of their family, including the two fine boys, thirteen and ten. "You would be so proud of them," she wrote; "they have accepted their new responsibility of looking after 'Mommy' so beautifully. It isn't surprising, however, with the grand example they always had! The most beautiful love story of all will never be written — unless I write it, Dennie — because we lived it!" She manages now, she says, partly on crutches, with occasional interludes of using only a cane. Those of you who knew Charlie well, drop Mary a line of cheer at 3139 Eton Avenue, Berkeley, Calif.

In mid-December, Jim Campbell, I, was honored by being elected president for 1940 of the New York Association of Consulting Engineers, an organization of which his firm, Eadie, Freund and Campbell, was a charter member. The membership includes a couple of dozen of the principal New York consulting offices which handle mechanical, electrical, and sanitary engineering of buildings and industrial plants. Jim said he saw

Phil Caldwell, I, and Larry Odell, XIV, at a fraternity banquet in New York on December 1.

Recent address changes show that Phil Kerr, II, chief of the P.W.A. review section, has moved in town from suburban Bethesda, Md., his home address now being 3717 Reservoir Road, N.W., Washington, D.C.; while Johnnie Scoville, IV, for many years with McLellan Stores, New York City, is now using his home address, 44 North Quaker Lane, West Hartford, Conn.

While you read this concluding sentence of the current notes, take out your pen and "write to Dennie" — that's how future notes are born. — ORVILLE B. DENISON, *Secretary*, Chamber of Commerce, Worcester, Mass. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford, Mass.

1912

It is with regret that we announce the death of A. C. Albee, I. A clipping from a Cleveland paper follows: "A. C. Albee, estimator in the Erie's engineering department at Cleveland, who lived at 12954 Clifton Boulevard, Lakewood, Ohio, passed away suddenly in the hospital January 9. Burial was in Meadville, Pa. Mr. Albee . . . had been at headquarters, engaged as Designer and Estimator since July, 1929. His service with the Erie dated back to 1913 when he was a member of the field corps at Saegertown, Pa., during second tracking of the Meadville Division, subsequently becoming Resident Engineer and Assistant Engineer. Later he resigned to go into the contracting business, eventually returning to the Erie."

Carl Rowley's daughter Jane, who last spring married Ralph B. Snow, is now living in Cambridge, as her husband is in one of the larger Boston law offices. Your Secretary greatly enjoyed having the newlyweds out for dinner recently.

Howard F. Clark rates as engineer instructor, Idaho National Guard, Boise, Idaho. He writes: ". . . Located in Boise, Idaho, for a four-year detail. I'm still with the army engineers, a major now. My stations change constantly; the last was at El Paso, Texas, where a lively Tech group, composed mostly of mining engineers, met often. Dean Lobdell '17 and one other M.I.T. emissary had meetings arranged for them while I was there. I find time for travel occasionally, and from Texas took a long trip into Old Mexico — a trip which I recommend to anyone who ever gets as far as the Rio Grande. Roads are excellent and exchange very favorable to American dollars. Scenery en route is excellent, too, though I do hail from California. Our nearest classmate, so far as I know, is Rudy Fox, in Denver, and I hope to look him up ere long. Meanwhile I am awaiting receipt of the new Register of Former Students, which will freshen up addresses and maybe spot some other Technology friends near here."

M. F. Graupner writes from Los Angeles that he is still hoping to sell one of his mines to some larger operator. He

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1912 *Continued*

laments the fact that he has made countless trips attempting to find buried treasures with the aid of doodlebugs, but has finally come to the conclusion that buried treasures appear only in fairy tales and that doodlebugs are fakers.

William S. Wolfe, X, has just been appointed factory manager of all United States branches of the Goodyear Tire and Rubber Company. Wolfe joined Goodyear in 1912 in the experimental department, following his graduation. He later left the company to become vice-president of the Seiberling Rubber Company, but returned to Goodyear in 1934 in the tire sales department. He was made assistant manager of the truck-tire department in 1936, and the following March was appointed manager of the development department. Wolfe was born in Pawling, N.Y. He is married and has one boy, Donn. The family lives at 2051 Ridgewood Road, Akron.

John Lenaerts sent a Christmas card from Meadville, Pa., where he recently joined Talon, Inc., and is now in the middle of the zipper business. — Doc Eisenberg has at last been heard from and can be reached care of Dolphe Martin, 1115 Madison Avenue, New York City. — FREDERICK J. SHEPARD, JR., *Secretary*, 125 Walnut Street, Watertown, Mass. DAVID J. McGRATH, *Assistant Secretary*, McGraw-Hill Publishing Company, Inc., 330 West 42d Street, New York, N.Y.

1913

Two members of our Class have recently gotten important jobs — C. Lalor Burdick, III, and Charles Edison, IX. Burdick was appointed assistant to the president of E. I. du Pont de Nemours and Company. After 1914, with his S.M. in Chemistry from the Institute, Burdick studied at the Kaiser Wilhelm Institute for Chemistry in Berlin, at the University of Basel, and at the University College in London. From Basel, in 1915, he got his doctor's degree in chemistry. Since 1928, Dr. Burdick has been with Du Pont. In 1935 he organized the Lalor Foundation for the support of purely scientific research, maintained by endowments from the Lalor family.

Harry Peck writes of Charles Edison: "You will perhaps be interested to hear of a very great pleasure I enjoyed recently at Washington. I was there just after the Senate confirmed the appointment of Charles Edison as secretary of the Navy. While at lunch with a business associate, the latter spoke of Edison as a friend, and I said he had been a classmate of mine at Tech. A few minutes later, the new Secretary entered the restaurant and sat at a table close by. My luncheon companion went over and spoke to Edison and promptly beckoned me to follow. To my surprise Charlie remembered me, and I enjoyed a few minutes' chat with him. Like most of us '13 men, he has put on weight and his hair is turning gray. His health appears to be excellent. While at the Capitol I heard only favorable comments about the new Secretary of the Navy, not only from New Dealers but from other Democrats and from Republicans as well. All

feel he is a most able executive and is exercising good judgment in the conduct of his department."

Dennie '11 thoughtfully sent a clipping from the Boston *Herald* about the death of Bill Eichorn's mother, who was a lifelong resident of Jamaica Plain, Mass., where she was active in civic affairs. Our deep sympathy to you, Bill, in your great loss. — FREDERICK D. MURDOCK, *Secretary*, Murdock Webbing Company, Box 784, Pawtucket, R.I.

1914

On the evening of January 10 Greater Boston Alumni met at the Institute for an informal smoker and demonstration on telephony. Although no attempt was made to organize local members of '14 to attend, your Secretary noticed that Fales, Crocker, and Clisham were present. Possibly there were others. — We recently reported that Lester Forbes, who has been in Paris for the Submarine Signal Company, had sent his family back to the United States but was remaining in France himself. His company subsequently ordered him home, and he is now safely back in the United States, where his mailing address is 1454 Beacon Street, Brookline, Mass. Because he has been out of the country for quite some years, he is anxious to renew contacts with his classmates.

Alden Waitt, major in the Army's chemical warfare service, who for several years has been at the Air Corps Tactical School, Maxwell Field, Montgomery, Ala., has been detailed to attend the next session of the Army War College. The session starts in September and runs through until the summer of the following year. Alden is very happy to receive this detail because it will round out the many years of school training he has been undergoing at the Army's various schools. When not studying, he has spent a good part of his time giving instruction.

Louis Charm wants to enter his claim for one of '14's first firsts: He claims that his daughter is the first daughter of a '14 man to marry a Tech man. Are there any other claimants? Louis' daughter, Sylvia, was married on December 24 to Ascher Shapiro '38, II, who is at present an assistant in thermodynamics at the Institute. Louis claims to be personally responsible for the wedding, for his daughter always had said she did not like Tech men. But on visiting Tech about two years ago, she met Mr. Shapiro and proceeded to change her mind very promptly.

Frank Ahern has reported from his annual tour of the West and has been trying ever since to convince your Secretary that the remark that Frank had the easiest job in the Class was not justified, and has even submitted literature to prove his case. But in spite of reports on the reduction in accidents, improved fire protection, and numberless studies on safety in general, the literature includes a picture of a fine motorboat sailing Lake McDonald, another of St. Mary's Lake in Glacier National Park, and so on. Each year Frank has to visit these places and ride in the motorboat to see if it has adequate

safety protection. He has to sleep at the various government park hotels, such as El Tovar at Grand Canyon, to make sure they are safe. If this is not the softest job in the Class, your Secretary is ready to receive further applications for entrance in the contest. In a recent publication Frank's soft job was camouflaged by adding these titles after his name: chief, safety division, National Park Service, United States Department of the Interior; chairman, Federal Interdepartmental Safety Council, 1937-1939; chairman, National Park Service's safety committee; member, National Park Service's building code committee; member, National Fire Protection Association's committee on safety to life and committee on house trailers; contributor to *Crosby-Fiske-Forster Handbook of Fire Protection*; member, Federal Fire Council and its committees. [This issue of *The Review* carries an article by Mr. Ahern on page 189. — *Editor*]

From the time you receive this issue of *The Review* to next Alumni Day there will be but three months. If you had a good time last year, why not plan to be in Cambridge on Monday, June 3? While we are not going to plan any jamboree such as we had last year in connection with our twenty-fifth, we shall, of course, arrange some form of get-together, and, as Dean Fales, says, "Now that we remained respectable through the twenty-fifth, we can again return to normalcy." — H. B. RICHMOND, *Secretary*, General Radio Company, 30 State Street, Cambridge, Mass. CHARLES P. FISKE, *Assistant Secretary*, 1775 Broadway, New York, N.Y.

1915

Only ninety-two days left to our twenty-fifth reunion, and by now you have received the first announcements. So begin to make your plans, as the committees will follow you up assiduously. I am happy to tell you that we have sufficient funds in the class exchequer to permit a low per capita charge, so that it should be possible for many more to attend.

We have lots of good notes for this month. The Christmas card from Phil Alger and his family in Schenectady, N.Y., took the form of a large folded card with pictures of Phil's children in familiar poses, as well as photographs of Boulder Dam, the Firth of Forth Bridge in Scotland, a pompous English parade, and a picture of Phil, himself, taken in California. The card was an unusual and attractive Christmas greeting, typical of Phil's originality. He and his family will attend the twenty-fifth reunion. He writes the following good letter: "This is belated by reason of initial mailing to a wrong address. Have you noted the very recent wedding of our classmate, Henning J. Berg, II? The Bergs are now living at 2335 Laguna Street, San Francisco. As the most recent addition to our class family, Mrs. Berg deserves a special invitation from you to our reunion. I had Christmas cards also from Ken Boynton in Mexico City, Douglas Baker in London, and

1915 Continued

B. W. Lassaff, just returned from Warsaw. Lassaff is now living in New York, where his business address is 17 East 42d Street, and he has for some years used the name Lassen instead of the Lassaff by which we knew him at Tech. I hope you gather in every class member extant and a story from each who cannot attend the reunion."

Herb Anderson of Philadelphia married Miss Alice Newman Ingersoll on January 20. To both Berg and Anderson go our heartiest congratulations and best wishes, and to their brides a cordial and sincere invitation to attend our twenty-fifth reunion. There are only a few of us bachelors left now. — On January 10 at Walker Memorial a dinner and meeting for Boston Alumni took place. This was hugely successful and I was glad to see the following classmates there: Henry Sheils, John O'Brien, Larry Landers, Vic Enebuske, Jac Sindler, Carl Wood, Marshall Dalton, Frank Foster, Ben Hurvitz, and Azel Mack. I am sorry if I missed any of our men who were present. A fine showing and an enjoyable evening should result in making this an annual affair to arouse and maintain interest and contacts among the many Alumni of Metropolitan Boston.

Lloyd Chellman writes a splendid letter from 33 East 22d Street, New York City. Despite his plea of being busily occupied, this good letter was written in longhand — all the more indication of his real class spirit: "In the far distant past, an appeal was received from your facile pen, which contained that now nationally famous phrase, 'Help Azel.' Being of simple and credulous mind, I was honored at being included on the sucker list and consequently had every intention of complying promptly with the request. For no good reason other than that my job with Uncle Sam entails the reading and answering of scores of letters every day so that personal correspondence therefore seems quite a chore, I have neglected to do my part of the lifesaving act. I have finally wearied of answering in the negative Mrs. C.'s repeated query, 'Have you helped Azel yet?' and herewith enclose the check with my apologies for the unwarranted tardiness. Nothing particularly startling has occurred in my life since last writing. My wife still lives with me and appears to like it; the son, after spending one year at Bowdoin, got a summer job with an engineering outfit and liked it so well he decided to work a year before continuing with college; the daughter is a junior in high school and is making plans to attend a New England college, to be followed by the Boston School of Occupational Therapy — trust the old man can find the necessary wherewithal. My best regards to you and those others — especially those who attend the class dinners, which gatherings I truly miss."

Another son of 1915 is headed for Technology. Vincent Maconi writes from 63 Brookside Drive, Hamden, Conn.: "I meant to answer your letter sooner. . . . You can count on me to do all I possibly can to make our Connecticut contingent attend our coming silver reunion. It is

hard for me to realize that twenty-five years have nearly passed since we left Tech. But nothing could possibly show me more clearly that many years have passed than to look on my son who is ready to enter Tech next fall. I took Richard to Tech the latter part of November, and he was interviewed by the Assistant Dean of Admissions. He made a good impression and I am sure he is more anxious than ever to attend M.I.T. We wandered through a few of the buildings but did not have time to see all that we hoped to. Henry Sheils and Johnnie O'Brien both recommended that I have Richard spend a few hours with you at the school. If you believe he should, I will arrange to take him to Boston later on, at your convenience, of course. Please drop in and see me if by chance you happen to be passing through our city. I wish you a very happy and prosperous New Year and send my sincere regards." — Henry Sheils and John O'Brien have been doing some construction business with Vincent in New Haven. What better proof of the adage "old friends are best friends" than business contacts among classmates. It will be a pleasure to welcome Vincent's son to the Institute, and I personally shall be glad to help and advise him and any other youngsters coming up here.

I recently heard from Allen Abrams in Rothschild, Wis., on some personal business. He seems well, happy, and busy. — "Help Azel" has apparently become a national slogan, not only with our classmates but with their families. Now let's see what you can all do to make our twenty-fifth reunion a huge success and really "Help Azel." — AZEL W. MACK, *Secretary*, 40 St. Paul Street, Brookline, Mass.

1916

Joe Meigs, who is a member of the firm of Gifford, Scull and Burgess, attorneys in New York City, is now a trustee of the village of Hastings-on-Hudson, N.Y., and chairman of the finance committee. This gives us two trustees in Westchester County, the other being Steve Brophy, who fills a similar capacity in Scarsdale.

The following news concerning Laurin Zilliacus appeared in the London *Evening Standard* of December 2: "Mr. Laurin Zilliacus, the Finnish schoolmaster who came to England in the hope of joining the British Army, flew back to Helsinki today. He is acting as a courier for the Finnish Legation in London, carrying a sealed box of official documents, and a consignment of medical supplies for wounded soldiers and air raid victims. Mr. Zilliacus is the second generation of his family to take part in the struggle against Russian domination. His father was an active member of the Finnish Nationalist movement in Tsarist days, and was expelled from Finland and went to live in Japan. Mr. Laurin Zilliacus was born in Yokohama. During the Russo-Japanese War, Mr. Zilliacus's father was a member of a conspiracy to run a consignment of arms and ammunition into

Finland with a view to an insurrection. The ship in which the arms were carried ran aground off the coast of Finland and was exploded by his partner in the enterprise to prevent the arms falling into the hands of the police.

"Mr. Laurin Zilliacus was educated mostly in the U.S.A., and he spent a short time at Oxford University. . . . After travelling widely through Europe he had visited almost every country, except his own, before he was 25. He settled down in England as a teacher at Bedales, the co-educational boarding school. After seven years he returned to Helsinki, where he started a co-educational school of his own. His school gained a great reputation at Helsinki. He gave up the headmastership at the beginning of the war for the express purpose of coming to Britain and trying to join the British Army. But as he is now 44, he was not accepted for service. Now he hopes to join the Finnish Army."

At last we have some firsthand news from B. C. Boulton, who will be remembered particularly well by classmates in Course I and those who attended summer camp at Machias in 1914. He writes: "Like many of our classmates, after practicing civil engineering for a year, I entered another profession, namely, aeronautical engineering, and for seven years was with the United States Air Corps, engineering division, at Dayton, Ohio, first in charge of structural analysis and then as project engineer on one of the first airplanes to be equipped with the turbo supercharger, which held one or two world records. In 1924 I entered private industry and was chief engineer for the Loening Aeronautical Corporation of New York City, which at that time was a pioneer manufacturer of amphibian-type airplanes for army, navy, and commercial uses. In 1928 I was transferred to the Keystone Aircraft Corporation in Bristol, Pa., which had purchased the Loening Corporation, and I carried on a similar type of work there and was also in charge of new design work at Keystone.

"In 1930 I joined the Glenn L. Martin Company of Baltimore, Md., as project engineer in charge of the United States Army bomber which was brought out in 1932 and set a new standard in bomber development. This particular airplane was for the next several years purchased by many foreign governments. It was the means which enabled the Glenn L. Martin Company to become one of the leading aircraft companies in this country. From 1934 to 1939 I was chief engineer and in 1938 was made vice-president and director. In the summer of 1939 I had a serious nervous breakdown and resigned from the company. Last November I joined the Lockheed Aircraft Corporation, one of the three largest aircraft companies in the United States, with an engineering staff of 725 men. Here I am assistant chief project engineer, in charge of design work on two large commercial transports, and am generally concerned with means for increasing the engineering efficiency of our personnel and improving technical and production standards of design.

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"It is probable that few of our classmates have found their work any more interesting than I have during the past twenty years, for there are few businesses which have developed both economically and technically as fast as aeronautical design and manufacture. The variety in the work is almost infinite, as executives in immediate charge of design have to be familiar with so many fields, such as highly refined structural analysis, materials (including knowledge of corrosion and its prevention), and metallurgy. In addition, the installation of our high-powered engines presents ever new and difficult problems, and we also have to be in the forefront of new developments on innumerable items of equipment, such as radio, electrical systems, and a wide variety of miscellaneous equipment from armament to passenger furnishings, as well as on the great field of aerodynamics, which is so phenomenally improving the performance of modern aircraft.

"My family consists, besides Mrs. Boulton, of four daughters from twelve to eighteen years of age, one of whom is now at Washington University in St. Louis, taking a course in occupational therapy, and my young son, aged four, upon whom the family's attention focuses. After having lived all of my life in the East and Middle West, I find California, its climate, and flora different and extremely interesting. We are looking forward with pleasure to staying here for many years, and regret only that we are so far from the old home base and our friends there."

George J. Mead, former Vice-President of the United Aircraft Corporation, East Hartford, Conn., was presented on January 26 with the Sylvanus Albert Reed Award for 1939, conferred annually for notable contribution to aeronautical engineering. Mead was credited by the Institute of the Aeronautical Sciences, donor of the award, with "the design and development of high output aircraft engines for military and commercial services." Mead has been largely responsible for the design of outstanding single- and double-row radial aircraft engines manufactured in this country and abroad. — JAMES A. BURBANK, *Secretary*, The Travelers Insurance Company, Hartford, Conn. STEVEN R. BERKE, *Associate Secretary*, Coleman Brothers Corporation, 245 State Street, Boston, Mass.

1917

Frank Peacock of S. Morgan Smith Company — water wheels and big valves — of York, Pa., dropped in to see the Secretary sometime before noon on January 9 after having attempted to locate the Dean of Students and finding the hour much too early for his arrival. Frank is investigating the possibility of producing power from special windmill design on which experiments are now under way.

Irving Crosby has been in Costa Rica studying a hydroelectric project involving a long tunnel and a dam. — Edwin E. Aldrin, New York aviation consultant, has become a lieutenant colonel in the Air Corps Reserve. — Lane, Beaver, Rog-

ers, Russell, Whitman, Jack Wood, and others lent their presence to the recent January Boston alumni smoker.

The New York *Times* says Lew Douglas has assumed the office of president and trustee of the Mutual Life Insurance Company of New York. Lew, it will be remembered, was a member of Congress from Arizona from 1927 to 1933, and in 1933 and 1934 was director of the budget at Washington. He resigned to become vice-president of the American Cyanamid Company, and for the last two years had been principal and vice-chancellor of McGill University.

And there is life in some of the old boys yet. To prove it, Enos Curtin sent us a clipping from the *Times* to show that a husky, twenty-three years his junior, had difficulty in keeping Enos from further progress in the recent squash tournaments in New York. J. W. Gerard, ranking No. 6 and "attached to the Seventh Regiment Squash Club, was given the toughest kind of competition by Enos Curtin of the Union Club before winning in five games, 15-14, 10-15, 10-15, 15-12, 15-8. Long rallies featured this engagement." — RAYMOND STEVENS, *Secretary*, 30 Charles River Road, Cambridge, Mass. PHILIP E. HULBURD, *Assistant Secretary*, Phillips Exeter Academy, Exeter, N.H.

1918

From our Class President, F. Alexander Magoun: "At our twentieth reunion in 1938, Pete Sanger suggested that it would be a gracious and appropriate thing if we should make a class gift to M.I.T. on the occasion of our twenty-fifth reunion. The more I thought about it and talked it over with classmates, the more enthusiastic I became. On inquiry, Uncle Horace Ford gave some inkling of what other Classes had done at their twenty-fifths — which is definitely the reunion of reunions. Some of them have contributed very substantial amounts of money.

"So when it became clear that the Class thought well of the idea and that there was excellent precedent, I had a long talk with Dr. Compton to determine what the Institute would welcome most. His first thought was a scholarship fund, which we reluctantly abandoned when a few calculations showed what would be needed.

"Then, remembering what an asset the rented Hammond organ had been at the baccalaureate this past June, I suggested that we purchase a first-class instrument and present it at our twenty-fifth reunion in 1943. To this proposal, Dr. Compton was instantly enthusiastic. It is encouraging to be able to report that everyone else who has heard about it has been equally eager for the project to become reality. It was of this that Gretchen was speaking when she chronicled the approval of the New York group in January's notes. I have even heard the hope expressed that we can get enough money this year to have the instrument in use during 1940-1941. There are always a few organizers in the student body (two in our own Class, Shorty Carr and Harry Camp)

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who could relieve the tedium of radio dinner music at Walker with a little Bach or Palestrina.

"With all this approval behind Pete Sanger's suggestion, there appears no reason for not going ahead with it. A suitable number of committees in various localities will be appointed to raise funds and also a committee to purchase the instrument. How much should you give? Something anyway, but we hope a very substantial number will give \$5.00 a year for four years."

The foregoing is all the news that I have to give you this month. There is plenty of food for thought in that, however, and I hope that the response will be great and enthusiastic. — Please send me news or this column will be a blank very soon! — GRETCHEN A. PALMER, *Secretary*, The Thomas School, The Wilson Road, Rowayton, Conn.

1919

Your Secretary appreciates the correspondence received from members of the Class and further urges replies to correspondence mailed. It would also be a very pleasant surprise to receive mail from members of the Class without the usual urging which has been necessary to date.

Members of the Class in New York had a dinner party on February 20 at the Technology Club, 24 East 39th Street, New York City. This was the first New York class dinner since the spring of 1939, prior to our twenty-year class reunion in Boston last June. The following 1919 men are members of the Technology Club of New York: S. H. Breed, Albert Mayer, R. S. Morrison, E. R. Smoley, Donald D. Way, A. R. Wiren, and Lester Wolfe.

Your Secretary received a very nice letter from Chuck Drew of Minneapolis, in which he reports about himself as well as about Fred Barney, Louie McCarthy, and Dick Coombs. His letter follows: "... Although you have had no tangible evidence, I have thought of you often. Between the *Oil and Gas Journal* and The Review, I have had a little picture of your activities — which seem to be many. I had high hopes of getting back to Boston this past spring for the reunion, but a number of things developed to make it impractical. That trip is on the schedule, though, at the first opportunity.

"My program has changed in recent years from one that formerly took me about rather extensively, to one that finds me either at home in Minneapolis or at our summer cottage in Wisconsin, near by. I did get to Alaska not long ago in connection with a mining operation in which I have been interested for some years. We have both a placer and a quartz operation under way not far from Fairbanks and will probably get another placer development started shortly. We operate as the Cleary Hill Mines Company. It is controlled by Twin City capital, and as treasurer I am glad to report solvency, dividends, and good progress. I'm also much interested in the oil and

1919 Continued

gas developments being carried on in Alberta and Saskatchewan by Franco Oils, Ltd. Dr. Hintze of Salt Lake City is their geologist, and they have been making good progress. Six exploratory wells drilled this year were all producers. They are getting a heavy crude, excellent for fuel and roads and still carrying some gasoline and lubes. Drilling is shallow (1,800 feet), so it is attracting considerable interest in Canada where these products are much needed in the Prairie Provinces.

"I was happy to hear from Fred Barney this Christmas and get him relocated. He is now living at 69 Greenwood Lane, Glenview, Ill. Louie McCarthy and Dick Coombs are both in the insurance business in Minneapolis. We are living in a nice part of the country, and I hope you can pay us a visit one of these days. Red flannels may be in order for a time now, but we seem to survive winters nonetheless.

"From what I see in the press, I judge things are going along nicely for you, and I surely hope so. I was happy to note not so long ago, too, that you had gotten yourself a partner, and I hope for you, Gene, that you are just half as happy as I have been. I went to Brussels, Belgium, to meet a red-headed gal from South Carolina. . . . I am sorry to report no family other than a badly spoiled Irish water spaniel. We find no difficulty in keeping busy, for there appear to be plenty of responsibilities of various sorts in this community, as in every other, to be taken on if one is so minded. I do hope you will let me hear from you when you can and that it won't be too long till I'll be seeing you again. . . ."

Robert S. Bolan has moved from Middleboro, Mass., and is now located at the Y.M.C.A. in Brockton, Mass. — Archer G. Smith has moved to Milton, Mass., but continues with the Copley-Exeter Corporation, Copley Square Hotel, Boston.

Your Secretary received the following note from Buzz de Lima before he and I attended the New York Osiris dinner together on February 2: "Thanks for your card and your fleeting salutation some three or four weeks ago. Sorry I couldn't stop to shake your hand and pass the time of day, but I was hotfooting it for a plane to Cuba. As a matter of fact, I have been commuting to Havana most of the year. Among my other little duties is the administration of the Hotel Nacional de Cuba — the finest and largest hotel outside the United States — I, who shouldn't, say it. There's only one disadvantage in being in Cuba: I so rarely see any of my old Technology friends. With you located so close by, we ought to do something about that. . . ."

The following note is from Marion Daniels, whom many of us will probably not remember since she was with the Class during the first year only: "As I was at M.I.T. only part of a year, I don't know anybody in the Class and I'm sure my doings are not interesting. I teach school in Boston, spend my summers mostly in a shack by the sea at South Wellfleet. Hobbies: pottery and stamps.

Have remodeled a small and ancient house in Boston where I now live. This is just to reply, but doesn't it seem best to drop me from the Class?"

Jacob M. Carter, Jr., writes from Monroe, La.: "Am still operating my carbonated drink business, bottling those pure refreshing beverages that exhilarate but do not stultify. This is the dull season in the drink business, but it affords me time to compile those governmental statistics, reports, and tax returns that fill the odd moments of the tired businessman. Am hoping for increased business in the paper mill and carbon-black districts that I serve. No changes in the family."

H. Cikins wrote from Dorchester, Mass.: "Glad to hear from you, Gene. Twenty years sure slipped by fast. After a number of years in engineering work, highways, railroads, shipbuilding, and dam construction, I have landed in the life insurance field and am getting along nicely. Am married and have three sons, future Northeastern warriors. Keep in touch with school affairs somewhat. Took in the most recent annual Alumni Dinner. . . ."

I had a very nice letter from Don Kitchin's wife, giving an interesting account of their family: "Our family is growing up so fast. Don, Jr., will be graduated next year from Tufts Engineering School (mechanical). He is twenty-one years old. Charles is nineteen and a sophomore at Harvard, majoring in languages — Spanish especially. Robert, who is sixteen and who will be graduated from Winchester High in June, hopes to get scholarship enough to go to Tufts. He got a very high grade in his chemistry college board and will take a special science exam in June. He will also apply at Harvard. . . . With three in school at once and all living at home, I have my hands full. Don takes them back and forth in the car. — Don is still at Simplex Wire and Cable and in tiptop condition. He doesn't smoke any more and eats raw carrots galore. Swims at L Street until December 15. Has a grand time walking miles — six or eight each night."

The following newspaper item from the Sarasota, Fla., *Herald* gives an interesting account of Charlie Parsons: "The first course in a series of three, on the technique of acting, to be given by Charles J. Parsons, The Players' professional director, begins . . . at the theater, Broadway at 15th Street. The technique of acting, specializing in stage deportment and pantomime, is the subject of Mr. Parsons' course and The Players are indeed fortunate in having a director qualified to teach a subject of such scope. . . ."

"Charles Parsons' theatrical interest began at the age of eight, and from then until he was graduated from college he participated in about 150 amateur productions. . . . Many were under excellent professional direction and he soon realized the advantages to be gained by working under good directors. While at 'Poly Prep' in Brooklyn and later with the 'Mask,' the dramatic club at Massachusetts Institute of Technology, he

appeared on every occasion, including leads in the varsity shows. A few years after leaving college he became aware that the theater was his destiny and he enrolled in New York's Feagin School of Dramatic Art, since the turn of the century one of the outstanding schools of its kind in the world. For two years he studied the technique of acting, stage design, stage lighting, direction, dancing, fencing and make-up. Here again, in addition to the regular curriculum mentioned above, he appeared under the direction of Hugh Miller, long-time director of the Birmingham (England) Repertory company, renowned in its field. While interested in every branch of theater, Mr. Parsons began his professional career as an actor. Before long, however, he found that his greatest interest lay in directing but in order to gain more experience and the so-called 'actor's viewpoint,' he continued during several seasons of stock. As actor, and later as director, he was affiliated with the theaters in Westport, Conn.; Mt. Kisco, N.Y.; Deer Lake, Pa.; Grove near Wilkes-Barre, Pa.; Mamaroneck, N.Y.; Huntington, L.I.; and worked with such eminent stage figures as Eugenie Leontovich, Edith Barrett, Henry Hull and Broadway Director Charles Hopkins. This summer, Mr. Parsons returned to the Feagin School . . . to review and prepare for these courses. . . ."

Your Secretary was indeed shocked to learn from Mrs. Guy Davis of El Paso, Texas, of Guy's death on July 24, 1937. I do not believe that this information has been published in *The Review*, and I recall that at our reunion in June many of our Class wondered how Guy was getting along and where he was. Your Secretary is writing Mrs. Davis in behalf of the Class, expressing our sympathy. — EUGENE R. SMOLEY, *Secretary*, 2 Fairmount Avenue, Hastings-on-Hudson, N. Y. GEORGE W. MCCREERY, *Assistant Secretary*, 275 Cypress Street, Newton Centre, Mass.

1926

This constitutes due and formal notice that at the big M.I.T. dinner at the Waldorf-Astoria Hotel in New York on March 5, the Class will hold a preliminary get-together to discuss the twentieth reunion. This should constitute an extra special reason for attending the dinner if possible. As you know, our classmate, Al Glassett, has a great deal to do with the affairs of the Technology Club of New York, and deserves your support for this particular occasion. Pete Lavedan, chairman of the reunion committee, will be on hand to answer questions as well as to get your ideas. — HAROLD BUGBEE, *Secretary*, 7 Dartmouth Street, Winchester, Mass.

1921

To the Class of 1887 and to its officers, Messrs. Taintor, Cole, and Very, go sincere thanks from all of us for their unique official greetings. We reciprocate their good wishes most heartily. — Congratulations are in order for a number of the Class whose notable achievements in

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their chosen fields have recently won them further recognition. S. Paul Johnston, II, editor of *Aviation* magazine, published by McGraw-Hill, is one of this group. The New York Times of January 11 relates Paul's appointment by the National Advisory Committee for Aeronautics as co-ordinator of research, with headquarters in Washington, D.C. Although the post is a new one, the department will be an enlargement of an existing function. Paul will be a member of all the standing technical subcommittees and will have assistants in the field to keep in touch with progress and needs of aeronautical science. Another item about Paul appeared in the New York Herald Tribune of January 14, which said: "Despite the obsession of most nations with war plane production, the real future of aviation lies in the field of civil aeronautics, Lieut. Comdr. S. Paul Johnston told the Tufts College Alumni Association at their autumn dinner."

Paul Rutherford, VI-A, is, according to the New York Times of December 13, the new factory manager of the Delco Products Division of the General Motors Corporation. Paul has been chief engineer of Delco for a number of years and has frequently been the subject of notes in these columns for technical papers he has presented as well as for his active participation in the Dayton Technology Association, of which he is a former president.

Charles A. Williams, VI, gave us barely time to record his election as secretary and treasurer of the United Illuminating Company of New Haven, Conn., before he climbed to further heights. The New Haven Register of January 2 announced Charlie's election as vice-president in charge of distribution and sales. — A. Royal Wood, VI-A, has been named as the new secretary and treasurer of the same company. Woody is an addition to the firm, although he has had charge of the design and installation of the company's new billing and accounting system since early in 1939. During that time he was on the staff of Lybrand, Ross Brothers and Montgomery. Woody originally entered the power distribution field when he joined the Philadelphia Electric Company immediately after graduation. In 1926 he was called back to Technology as assistant professor of electrical engineering and in 1928 he entered the public utility accounting field. Charlie and Woody are now duly installed in the regal offices of United Illuminating Company's handsome new building in New Haven.

A. Warren Norton, XV, has been appointed manager of the Christian Science Publishing Company, Boston. Warrie has long been associated with newspaper work, having been at one time with the Brooklyn daily *Eagle* in its advertising, circulation, and promotion departments, and, for the past seventeen years, with O'Mara and Ormsbee, Inc., of New York, publishers' representatives. As a partner of the latter firm, he was closely identified with many outstanding newspapers throughout the country. Warrie has been active in alumni affairs in the Technology Club of New York and, in his present

capacity, as vice-president of the Alumni Association. Besides serving on many committees, he headed the group which staged the entire program of last Alumni Day. Warrie's new address is *Christian Science Monitor*, 1 Norway Street, Boston, Mass.

Academic honors have come to Bernard H. Moran, II, who has added the title of professor. Bernie is a member of the faculty of Holy Cross College, Worcester, Mass., and makes his home at 6 Grant Street, Natick. — It is now Dr. Donald S. Piston, VIII, according to news from Fresno, Calif., where Don lives at 2823 Harrison Avenue. — United States Army promotions include that of Sydney S. Winslow, Quartermaster Corps, Fort Shafter, Hawaii, to a colonel; that of Stanley L. Scott, I, who is district engineer, located in the Gay Building, 300 Broadway, Little Rock, Ark., to a lieutenant colonel; and that of Herman H. Pohl, I, Office of the District Engineer, Honolulu, T.H., to a major. — From the United States Navy comes news of the advancement to commander of Theodore L. Schumacher, XIII-A, Navy Yard, Philadelphia, Pa., and the commission of lieutenant commander for H. Raymond Healy, XV, Bureau of Navigation, Navy Department, Washington, D.C.

Norman F. Patton, IX-B, is about to join the ranks of the benedicts. Says the Boston Evening Transcript: "Mrs. Francis Lambert Thornberry of New York and Mt. Tabor, N.J., announces the engagement of her daughter, Miss Elizabeth Cleveland Thornberry, to Mr. Norman Frisbie Patton, son of Mr. and Mrs. Guy Patton of New York. Miss Thornberry attended the New York School of Fine and Applied Art. Mr. Patton was graduated from M.I.T. and is director of the bureau of information of the Anthracite Institute, 19 Rector St., New York." — A recent issue of *Science* has the interesting news that Edwin L. Rose, VI-A, chief engineer of the Waterbury Tool Company, has collaborated with Vannevar Bush '16, President of the Carnegie Institution of Washington, in the invention of an ingenious pump that can compress gases, create vacua, or transfer heat against normal direction of flow. Patent No. 2,175,376 has been issued to cover this device.

Some of the many new addresses received are: Dwight Baldwin, II, 8 Harvard Terrace, Allston, Mass.; James E. Baylies, VII, Post Office Box 1094, Los Angeles, Calif.; Percival B. Crocker, II, 27 Baker Street, Foxboro, Mass.; John S. Cummings, VI, Apartment 2B, 1055 North 22d Street, Allentown, Pa.; Lieutenant Colonel Robert E. Guthrie, I, Fort Rosecrans, San Diego, Calif.; Harold C. Johnston, 107 Alfred Drown Road, West Barrington, R.I.; Herman S. Kiaer, XV, The Horton-Brown Corporation, 149 Broadway, New York, N.Y.; Robert P. Kite, X, The Dorr Company, Inc., 570 Lexington Avenue, New York, N.Y.; the Rev. Samuel H. Miller, I, 15 Ware Street, Cambridge, Mass.; Harry M. Myers, X, 105 Country Club Road, Newton Centre, Mass.

Changes in location have also been noted for James S. Parsons, XV, 4 High Street, Gloversville, N.Y.; Victor S. Phaneuf, II, Hollis, N.H.; William J. Regan, I, Barrett Associates, Inc., 14 Wall Street, New York, N.Y.; Harry R. Swanson, X, President, Petro-Chem Development Company, Inc., 120 East 41st Street, New York, N.Y.; Mrs. Irving Whitehouse (Helen C. Lord), VII, 4409 Renwood Road, South Euclid, Ohio; Bradley P. Williams, XV, 2233 Orrington Avenue, Evanston, Ill. — RAYMOND A. ST. LAURENT, Secretary, Rogers Paper Manufacturing Company, Manchester, Conn. CAROLE A. CLARKE, Assistant Secretary, International Telephone Development Company, Inc., 137 Varick Street, New York, N.Y.

1922

We congratulate classmate Allan H. Kidder, who is assistant engineer of the Philadelphia Electric Company. He recently won first prize in the James H. McGraw awards of the Edison Electric Institute for his work as co-author of the paper "Increased Loading of Apparatus and Lines Permits Practical Economies." — Charlie Fulton has taken to drugs. He has vouchsafed the appetizing information that he is a chemist in the United States Treasury Department, particularly concerned with the analysis of liquor and narcotics, including the notorious marijuana. Fulton is married and has three children.

A number of '22 men were present at the midwinter meeting of the Greater Boston Alumni, held in Walker Memorial on January 10. Yard Chittick spotted Minot Edwards, Ed Fales, Warren Ferguson, and Bob Tonon, and he is sure there were others present also. It seems to us, however, that the attendance of our Class at Institute affairs is below par, considering the size of the Class. But it is likely that we contribute much through personal efforts in local Clubs. A roster of '22 men who are taking part in alumni affairs will be forthcoming in a later issue.

Edward L. Moreland '07, Dean of Engineering at the Institute, has asked if we can locate a Technology man who worked with a man in Chicago on some mechanical development. The widow of the Chicago man knows only that the mechanical engineer was a graduate of M.I.T., in his early forties, slightly over six feet tall, and played the pipe organ at some church while attending M.I.T. If you recognize this description as fitting anyone in our Class, will you please give his name and address to Professor Moreland. — CLAYTON D. GROVER, Secretary, Whitehead Metal Products Company, Inc., 303 West 10th Street, New York, N.Y. C. YARDLEY CHITTICK, Assistant Secretary, 77 Franklin Street, Boston, Mass.

1923

Jack Keck writes: "In my collection of Christmas cards I got one from Stuart MacDonald, who used to be my roommate and Course X pal. He now lives in Rochester, N.Y. (164 Eastland Avenue).

1923 Continued

He was in Jacksonville, Fla., for quite a while, and has two fine boys and a girl."

Walter E. Richards, major in the United States Army, reports that he was retired from the Air Corps in September. The following month, he joined the United Aircraft Corporation as supervisor of the Pratt and Whitney and Hamilton Standard Engine and Propeller School, and is located at East Hartford, Conn. — E. F. McSweeney, Jr., reports briefly that he has his own office at 9 Rockefeller Plaza, New York, and that he is working in the general field of management consultation, with particular emphasis upon industrial surveys and marketing. — This is not much information, but is better than that I've had from many members of the Class. If any of you want to take this as a hint, let's hear from you about any changes in jobs and locations, or about additions to the family.

This month one of the girls in the Class produces a letter with some real news in it. Gladys Farmer Noble (Mrs. Laurence E.), writing from 1316 West York, Enid, Okla., says: "We've had visits from two members of '23 in the past year: John H. Little spent a week end in Enid in the spring and told us of a new home he had just completed for his family near Detroit. Brick Mower '29, now Captain Mower, has stopped here several times with his charming wife, en route for San Antonio from Fort Riley, Kansas, where he is stationed. Last summer my seven-year-old daughter, Barbara, and I visited Doc and Eleanor Smith in Cleveland. Doc and Eleanor have two lovely children and a very nice home. So far as I know, I am the only Tech 'man' in this vicinity, and people here are so unfamiliar with the Institute that they don't know I'm a freak, and I get by as a normal human being. Enid is a prosperous town of about thirty thousand, the county seat of a fine wheat-farming community. Even so, the Champlin Refining Company is the town's largest industry, and Larry is purchasing agent for that company. We have been in Enid almost twelve years now." — HORATIO L. BOND, *Secretary*, 457 Washington Street, Braintree, Mass. JOHN M. KECK, *Assistant Secretary*, 441 Mount Prospect Avenue, Newark, N.J.

1924

Several members of the Class attended the midwinter meeting of Greater Boston Alumni, held at Walker Memorial on January 10. Among them were Jack Stanton, Ray Lehrer, Del Kendall, George Swift, E. L. Quirin, George Neitlich, and Ray Dorr. — Bill Corrales writes that the party usually held by the New York group in February was postponed because of the Technology Club dinner for Dr. Compton, scheduled for March 5, but that the '24 group plans a meeting and dance after the dinner. Those interested should get in touch with Bill at the Municipal Building in New York City.

A review of the Alumni Association's directory reveals many '24 men who are active in Institute affairs. They include Chick Kane, Advisory Council on Un-

dergraduate Publications; Bert Stewart, Council member for the Pittsburgh Club; Doug Elliott, Secretary-Treasurer of the Birmingham Club; Perry Maynard, Secretary, Detroit; Doc Hancock, Secretary-Treasurer at Louisville; William L. Lamm, Secretary-Treasurer, Mexico City; Bill Coleman, President for Newark; Hunt Wardwell, President, New Bedford; and the following Honorary Secretaries of M.I.T., appointed by Dr. Compton to act as academic ambassadors: Bill Robinson, Los Angeles; Bill Coleman, Bloomfield; Curtis Plant, Jersey City; Marshall Waterman, Poughkeepsie; Denton Massey, Toronto. The Class Secretary is a new member of the Advisory Council on Athletics.

Charlie Phelps reports that Gib Cowan has returned to Sault Ste. Marie, Mich., to enter business with his father, and that Dave Meeker is vice-president in charge of engineering of the Hobart Manufacturing Company of Troy, Ohio. The firm of Peirce-Phelps, Inc. (Wilmot G. Peirce, Jr., President; Charlie Phelps, Secretary-Treasurer and manager), is still alive and prosperous, operating from 437 North 5th Street, Philadelphia, Pa. — FRANCIS A. BARRETT, *General Secretary*, 50 Oliver Street, Boston, Mass.

1925

A number of our Class were present at the highly successful midwinter get-together of the Alumni Association. Present, in addition to your Secretary and Hank Cunningham, former Secretary, were Bob Hodson, Jim Howard, Francis Turnbull, and Courtenay Worthington. You will doubtless find an account of the meeting elsewhere in this section [see page II], so it will suffice to say here that the buffet supper, the talks, and the telephonic demonstration later were heartily enjoyed.

The Boston *Evening Transcript* for December 7 carried announcement of the engagement of Charles Ladd Norton and Dr. Josephine Hopkins of Smith and the College of Physicians and Surgeons of Columbia. Charles is with Babcock and Wilcox in New York City. — Leonard W. Olson of Minneapolis, Minn., died on December 20. He was a graduate of VI-A. Unfortunately we have no details as to the cause of his death or of his work since graduation, but we will endeavor to supply them later.

Count Blonsky is now at Sunbeam, Idaho, with the Custer Consolidated Mines, Inc. — A. S. Bruna, III, in a note to Professor Locke '96, transmitted via Doc Foster, states that he recently visited his people in Chile and had an opportunity to call on a number of his friends in the nitrate pampas. He is still working in London in the European sales organization of the Nitrate Corporation of Chile, Ltd. The war has brought many changes, the main one being the rupture of the international nitrate cartel due to the fact that the Germans were in it. The result is that today, Chile Nitrate is working independently. Conditions are very difficult because of the fact that freight rates are four times as high as be-

fore the war. Bruna cannot get used to the blackouts, he says, and finds it very disagreeable to get around. During the last year, he lost both of his parents. More recently, he married Señorita Amada Vargas. He had intended to visit Chile and travel by way of the States some time during the coming year, but the war has spoiled everything.

I wrote to Merida Crum, XV, who is now at Bartow, Fla., after having been at Vero Beach in that state for some time. His reply contained quite a bit of news. He says: "I saw Charlie Kuhn a couple of months ago. For the past eight years I have known Charles Jewett very well. He works with the Jewett Appraisal Service, and I presume he is a member of the firm now, although he started working for his uncle at first. From all indications they have a very good business, and he seems well, happy, and contented, though married. He has several children. His wife is an excellent musician, teaching piano."

"I hear quite often from George M. Patch, X, who is a chemist with the Standard Oil Company at their Baton Rouge, La., refinery. I visited him way back in 1934, seeing all the refinery permissible. Boyer, X, who later took an advanced degree, was then superintendent of the refinery, so those two have been quite closely associated all these years. Patch has two children about ten or twelve years of age, and has recently built a new home, living on Route 2 out from Baton Rouge. I understand that Herbert Booth is still at Sarasota, presumably still in the banking business, but I know very little about him. He was also in school with me at Stetson, and a frat brother there prior to our going to the M.I.T."

Keep the reunion in mind, and plan also to attend Alumni Day on June 3. Barrett '24, the chairman of the committee in charge, announced at the midwinter meeting mentioned above that Alumni Day will be one of the best ever. — HOLLIS F. WARE, *General Secretary*, 3 Aquaviva Road, Medford, Mass. F. LEROY FOSTER, *Assistant Secretary*, Room 6-202, M.I.T., Cambridge, Mass.

1926

The migratory instincts of the Class seem to be more pronounced than usual this year, if we may judge from the many changes in addresses which have reached the Secretary. Judson T. Biehle is now at home at 622 West 114th Street, New York, after a stay in Baton Rouge. — Robert R. Ellis, Jr., who has been in Colombia, South America, is now in Lima, Peru, where he is with the Frederick Snare Corporation. Also with this same corporation is C. S. Canals, who has changed from Lima to 114 Liberty Street, New York. — William M. Davidson, who has been such an active club officer and honorary secretary in Harrisburg, Pa., is now living at 222 South Main Street, Wilkes-Barre, Pa.

Norman C. Hill is now at 420 Avon Drive, Mount Lebanon, Pittsburgh, Pa.; former address: Longmeadow, Mass. —

Come Back to Tech on June 3 — Alumni Day

1926 Continued

William H. Hoar, sometime of Utica, is now in the office of the bridge engineer, Southern Railway System, Washington, D.C. — Henry A. Sargent has moved from Oberlin, Ohio, to Lincoln, Neb. — Two '26 men with the Ethyl Gasoline Corporation have recently changed locations: Douglas P. Jeppe has come halfway round the world from Melbourne, Australia, to be in the main office in the Chrysler Building in New York, while John H. Schaefer is at the same address after having been in Wilmington, Del.

Robert W. Conly recently received notice in New York and Boston press reports as the result of his appointment as superintendent of agents of the Boston office of the Aetna Casualty and Surety Company. Conly has been with this company since graduation. Following a course at the home-office training school, he went as special agent to Philadelphia, where, for the past five years, he has been superintendent of agents with notable results. — The Boston contingent turned out in excellent force at the recent buffet supper meeting of the Alumni Association in Walker Memorial. Among those present were G. Malcolm McNeil, Donald Cunningham, George Smith, William Hinckley, C. Marvin Pickett, Jr., and several others whose names your Secretary unfortunately failed to jot down. — Thomas M. Rowlands of the University of Washington in Seattle is now a professor. — JAMES R. KILLIAN JR., *General Secretary*, Room 3-208, M.I.T., Cambridge, Mass.

1927

"A chemical engineer from M.I.T. decided back in the late '20's to take up farming. Nobody could see much sense to it — wasting good time in a top engineering school and then becoming a Portsmouth dirt farmer. But William H. Richards did. Silly? He learned that chemistry helped him to rotate his crops, dispense with horse-and-buggy-day fertilizers in favor of chemicals; that a surveyor's transit can be used to plot and grade his land to stop bad soil erosion." This quoted article continues for two solid columns in the Providence *Evening Bulletin* of December 4 and relates the amazing success that Richards has had in his scientific farm project. Bill has been married a number of years and has two children.

Dick Roth, who has been unmentioned in these columns for several years, is married, has a seven-year-old son, and lives at 210 West 101st Street, New York City. He has been with Emery Roth and Sons, architects specializing in large apartment houses, and is a member of the American Institute of Architects. — We are happy to welcome to this column a newcomer, Miss Abigail Coburn, born in late October to Dice and Bee Coburn. Our congratulations are belatedly extended herewith. Dice continues to make coke for the Wisconsin Steel Company in his capacity as assistant superintendent of the coke plant. — Jim Flagg writes that he has been in Knoxville, Tenn., since July, 1935, with the T.V.A. —

Congratulations to Ralph Stober in view of his recent promotion to the position of plant manager of the Simplex Wire and Cable Company, Cambridge.

Of particular interest to the New York crowd and to any '27 men who can be in that area on March 15 is the '27 dinner to be held at the Technology Club, which is located at 39th Street and Madison Avenue. The success of these affairs has been repeated often, and their continuation bespeaks their popularity. An invitation is issued to all who are able to be there. The first huddle starts around 6:00 P.M. in the pine-paneled bar, and the dinner call is rung about seven o'clock. Bob Bonnar of General Dyestuff Corporation, New York City, is again in charge. A call to him or to your Secretary will be all that is needed to save you a place at the festive board. — RAYMOND F. HIBBERT, *General Secretary*, Care of Johns-Manville Corporation, 22 East 40th Street, New York, N.Y. DWIGHT C. ARNOLD, *Assistant Secretary*, Arnold-Copeland Company, Inc., 222 Summer Street, Boston, Mass.

1928

From Orville Denison '11 at the Chamber of Commerce in Worcester, Mass., I have had the news that Waldo Keyes, one of our real dyed-in-the-wool Bostonians, has recently joined the Kimberly-Clark Paper Corporation of Chicago. Congratulations to Waldo and thanks to Obie Denison. — Ken MacKenzie, who has been with Eastman Kodak at Rochester since leaving the Institute, became assistant superintendent of Eastman's paper mills in 1936. He has been married since 1931. — Ed Poitras, who has been employed by the Lombard Governor Company at Ashland, Mass., has been loaned by that company to the California Institute of Technology for work in connection with the new telescope. Ed has been working on control instruments to correct for certain errors so that the star field will remain fixed with respect to the giant sky camera's photographic plate.

Art Josephs hangs his hat at the Shelton Hotel in New York, and it was there that Ralph Joep and I ran into him before breakfast one day in January. Art is now on the engineering staff of the Electric Bond and Share Company. — Jim Donovan was recently in New York on some special consulting work. He's kept very busy by his many activities as top man at Artisan Metal Products, Inc., Boston. — Grant Flynn, after a most adventuresome career in South American aviation, is now working in the radio department of the Ruthrauff and Ryan Advertising Agency, Chrysler Building, New York City. — Joe Gaffney is now manager of Sears Roebuck's store at Waltham, Mass., having been moved early last fall from the managership of the Sears store in Quincy. — Dame Rumor has it that Bus Ruch is now teaching meteorology at the California Institute of Technology. Can anyone, including Bus himself, straighten us out on this point? — GEORGE I. CHATFIELD, *General Secretary*, 6 Alben Street, Winchester, Mass.

1930

The midwinter meeting of Greater Boston Alumni found seven '30 men gathered (or standing, because of the crowd) around the festive board. We singled each other out, one by one, had a lot to talk about, and generally started the ball rolling for our ten-year reunion, June 1 and 2. In passing, may we put in a word for Alumni Day, which comes this year on June 3, immediately following our reunion. We expect to see 1930 well represented at both the reunion and Alumni Day. Five of the seven men at the meeting had been present at Toy Town Tavern for our five-year reunion in 1935; so enthusiasm started off in high gear rather than in low. Jack Latham and Fred Twarogowski represented Course II, and the others were Ed Depoyan, III, Scotty, VI-A, Tony Savina, X, Al Perkins, XVII, and your Secretary. Jack has two children; Scotty and Perk are married but, like your Secretary, have no children; each of the others is both wifeless and childless. Perk has been recuperating from a serious illness and expects to be back at work again soon. Tony is a chemist with the E. L. Patch Company in Stoneham, while Ed is partly responsible for the shaves some of us are enjoying with our Gillette "Tech" razors. Jack has been one of the Polaroid pioneers; Scotty is with the General Radio Company; while Bethlehem Steel's shipbuilding division claims the allegiance of Fred and yours truly.

From Yicka Herbert, V, comes a very modest letter in which he says his golf game isn't so good these days, but you can just bet he'll have the putts dropping by reunion time. He was medalist in our tournament in 1935 and he's had five years in which to iron out his shots. Yicka is at the Newark branch of E. I. du Pont de Nemours and sees Hijo Marean once in a while at Wilmington. He likewise sees Dick Berry in Indianapolis, where the latter is a Barbasol man. Herb Wampner is another Course V man with whom Yicka has been in touch; Wampner lives in Terre Haute and is a proud parent. Eddie Hill is now an intern at the Massachusetts Memorial Hospitals and this summer will take over new duties with the Rockefeller Foundation, according to Yicka. Many thanks for the newsy letter! Yick is all steamed up about the reunion and is selling the idea to all the 1930 men he sees or contacts. For the rest of you, save the all-important dates of June 1 and 2 for the best time ever! — PARKER H. STARRATT, *General Secretary*, Bradley Park Drive, Hingham, Mass.

1932

Patricia Ann is the new arrival in the family of Charles M. Thayer. — The announcement card of Mr. and Mrs. Eugene Francis Lynch states that their new daughter's name is Catherine Mary.

The engagement of Miss Phyllis Harriet Germain to George Richard Green was announced in mid-December. Miss Germain is a senior at Boston University. — Another engagement, for which we have a January clipping, is that

1932 Continued

of Miss Margaret Jane Jackson to Joseph Welch, Jr. — On December 27, Miss Leola Reuter of Waterbury, Conn., was married to John Loustanaun of Port Arthur, Texas. Miss Reuter was graduated from Emerson College in 1934.

Professor Locke '96 passes on the news that Clarence Lee Woods, who is with Marsman and Company in the Philippines, planned to make a trip home to Dixon, Mo., about the end of January for a short stay. — In Bound Brook, at the dentist's one Saturday morning, your Secretary had to wait for Bill Hodges to get out of the chair, and was followed by John Graham. Quite a concentration of the Class. — CLARENCE M. CHASE, JR., *General Secretary*, 1207 West 7th Street, Plainfield, N. J. CARROLL L. WILSON, *Assistant Secretary*, Research Corporation, 137 Newbury Street, Boston, Mass.

1933

A note from Gordon C. Pratt informs us that he married Miss Marjorie Damon on August 5 at Taunton, Mass., and that he is now in his second year as house officer in the Buffalo Children's Hospital. — We hear that Robert L. McCormack was married on December 21 to Miss Catherine Worden of Brookline, Mass., and that they are now living at Holden Green, Cambridge. — Also living in Cambridge is Edward P. Hutchinson, who was married on January 6 to Miss Alice Louise Forbes of Swampscott.

We read, too, of the marriage on December 2 of Miss Ruth L. Thomas to Arthur S. Hayden. They are living in Portland, Maine. — On January 20, Miss Catherine E. Recknagel of Brooklyn, N.Y., was married to George H. Ropes. We note that Asa H. Jewell, also Course XV, was one of his ushers, and that David Smith, VI, was his best man. — The only news of an engagement is that of Miss Harriette L. Barnard to Walter D. Teague, Jr. They expected to be married this winter. — GEORGE HENNING, JR., *General Secretary*, Belmont Smelting and Refining Works, Inc., 330 Belmont Avenue, Brooklyn, N.Y. ROBERT M. KIMBALL, *Assistant Secretary*, Room 3-102, M.I.T., Cambridge, Mass.

1934

There is very little news to report this month since the letters received have been notable by their absence. Of course, I realize the reason: You fellows are just storing up news and are getting ready to pour it in upon me by the ream. — We have recently learned that Henry C. Miller, Jr., VI-A, has been made assistant to the Vice-President of the Consolidated Gas, Electric Light and Power Company, of Baltimore, Md. He was promoted from a position as engineer in the intersystem power-utilization bureau of that company. — Charles A. Wesley is now research assistant with Interchemical Corporation in New York City. He is married and has a son two years old. — Here is news concerning the wife of one of our members: Mrs. Vilma Zaroodny played a group of piano and violin solos at a

party of the Yale Dames, of which she is a member. Serge Zaroodny is a laboratory assistant at Yale this semester.

Mrs. Walter H. Steel of Newark, Del., has announced the engagement of her daughter, Miss Phoebe Elizabeth Steel, to Philip Goodwin. — Mr. and Mrs. John C. Dye of Medford, Mass., have announced the engagement of their daughter, Miss Ruth Dye, to Robert Wallace Fay. Wally is now working for American Airlines, Inc., at the East Boston airport. — Announcement has been made of the engagement of Miss Alicia Garfield, daughter of Mr. and Mrs. Mason Garfield of Cambridge, to John Boit Cabot. John has designed houses and sets in Los Angeles and Hollywood and was associated with Norman Bel Geddes as a color expert and designer on the Futurama of the General Motors exhibit at the New York World's Fair. He is also a member of the board of directors of the Housing Securities and Westover corporations. — Miss Leonora Bixby, daughter of Mr. and Mrs. Walter Bixby of Roxbury, Mass., was married on November 11 to James Sweeney. The ceremony took place at St. Patrick's Church in Roxbury. Jim and Mrs. Sweeney are living in New York. — JOHN G. CALLAN, JR., *General Secretary*, 184 Ames Street, Sharon, Mass. ROBERT C. BECKER, *Assistant Secretary*, Chile Copper Company, Chuquicamata, Chile, S.A.

1935

About time you sent in a bit of news, gang; we are running rather low. Mal Porter has succumbed to the wiles of Miss Betty Bull of Washington, D.C. They have announced their engagement. Mal is currently employed by the E. I. du Pont de Nemours and Company in Denver, Colo. — Bob Scribner has received his doctorate and is now an intern at the Bellevue Hospital in New York City.

Jack Colby has seen a number of the tribe: Dick Hughes, who is in New Britain, is still with Corbin Screw Division, America Hardware Corporation. Dick became a proud papa last fall. Al Greenlaw, who is in charge of the research department of Tuttle and Bailey, Inc., New Britain, has a patent on a new ceiling-type air diffuser which is better and cheaper than old types. Johnny Talbert is a "big shot" with Wright Aeronautical Corporation on supercharger design. Lars Ekwurzel, who has one offspring to his credit, is working for an advertising agency, Beaumont, Hiller and Sperling, in Reading, Pa. Carson Brooks, who is plugging away for the Aluminum Company of America in Massena, N.Y., has the job of seeing that two million pounds of aluminum go through the casting department every week. Bob Forster is in Albany with a dealer for the York Ice Machinery Corporation. Jack Colby, himself, is still with Johnson Service Company in the automatic control racket, trying to make people comfortable.

Dick Lawrence received a couple of letters of which the following are extracts. From Bob Olsen: "I have not met any out this way, so I can report only

personal affairs. Believe it or not, I am teaching industrial engineering at Cornell University at present, including a course in micromotion analysis and one in factory layout. This latter course includes laying out to scale a modern plant which manufactures automobile transmissions. The boys really seem to learn a lot more this way — that is, by actually drawing up the whole plant, cutting templates, and so on. I've been married about a year, have no children, and own a three months' old beagle which I hope to take hunting next fall. This teaching certainly is the berries. When you work, you really work, but in between times there are lots of vacations. However, I plan to work in industry this summer."

The other letter is from Bart Chapman, who was married to Jeanette Birkett in Needham last October 14. He says: "Just a few weeks before the wedding, Remington transferred me to the target and trap works in Findlay, Ohio. It involved some hustling to homestead there rather than in Bridgeport where we already had an apartment. My work at present is research in target manufacture, but I expect soon to busy myself with product and process engineering on traps. We went to Sea Island, Ga., on our honeymoon and encountered Charlie Taylor there on similar business. On the way home we saw Eric Jones in Philadelphia. He is still flying and is treasurer of the Penn River Corporation."

At Tech on January 10 there was a mid-winter gathering of Alumni from around Boston. Present were Jack Hossfeld, Gay Rich, Henry Kimball, Prescott Smith, Irving Banquer, Vincent Sorrentino, Dave McIntosh, Walt Stockmayer, and Dick Lawrence. Banquer has started a jewelry business and employs about fifteen persons. Some of the fellows have been seeing hockey games, usually Jim Notman, Dave McIntosh, and Dick Lawrence. Paul Daley was in town at Christmas and took in one of the games. Paul is assistant to the president of a Chicago firm which manufactures insulating materials, mostly for the air-conditioning industry. For those interested in hockey, Boston offers one of the finest amateur teams in the country, which plays in the Provincial League, a Canadian circuit consisting of seven Canadian teams and the Boston Olympics. The latter is leading the league. — Remember the reunion next June. Place: Mayflower Hotel, Plymouth, Mass. Dates: June 1 and 2. Information will be going out soon. Let's make this reunion a whopping success. — ROBERT J. GRANBERG, *General Secretary*, Care of W. C. Voss, 9 Old Town Road, Wellesley Farms, Mass. RICHARD LAWRENCE, *Assistant Secretary*, 111 Waban Hill Road North, Chestnut Hill, Mass.

1936

The XYZ Club of our Class held its annual meeting as usual this year on the Sunday preceding Christmas at the Old France. Elliott Robinson sneaked a few moments from studying for his exams at Harvard to tell us about the meeting:

Come Back to Tech on June 3 — Alumni Day

1936 Continued

"Brent Lowe was there when I arrived; he is enjoying his work with the Auburn, N.Y., Button Works. He is at present living with some other fellows at 27 Williams Street in Auburn. Next to arrive was Bob Worden, now proud father of a young son who promises to be a good soup eater to help Campbell's sales. Bob, Annette, and Butch (I believe) live at 222 Campbell Avenue in South Ardmore, Pa. Bob Sherman came in next. Then Claxton Monro, Jr., another of our businessmen from New York. He not only enjoys his advertising work in the office but also has a chance to do considerable interesting interviewing outside. He may be reached at 11 Concord Avenue in White Plains. Last came Dick Odiorne, another advertising expert all full of interesting information. He invited us to his apartment just to say 'hello' to Louise and his father, who was there at the time, and to look at the furniture that Dick and Louise have devised to make living in a small apartment exciting and comfortable. There are more gadgets, folding tables, and bookcases . . . and the kitchen is the housewife's dream, for it requires almost no steps to get at absolutely all the essentials for cooking a complete meal. . . ."

My only other letter is from Mart Gilman, VI-A, who says: "So they go, one by one." You guessed it, his engagement to Miss Mildred Halfmann, sister of Ed Halfmann, has been announced. A family party at the Halfmann home in New York City was the occasion for the announcement, with Ed having as much fun as anyone by shooting a reel of colored movies to celebrate. Miss Halfmann was graduated from Simmons College last June. — Another engagement is that of Warren Devine, XV, and Miss Ada Hueston of Arlington. Since Warren is now reported to be in Alameda, Calif., I am wondering if he took a new bride with him. — A fellow member of Course XV, Julian Rifkin, is also engaged; the young lady is Miss Leah Adaskin of Springfield, Mass. Julian is now connected with the motion picture business and is owner of several theaters in western Massachusetts. — The marriage of Miss Margaret Fogler and Frank S. Gregory, Jr., X, took place on Saturday afternoon, December 23, at a small wedding at the Belmont home of her parents. A reception followed the wedding. Frank is a chemical engineer for the B. B. Chemical Company of Cambridge.

Al Bagnulo, XI, has now traveled with the United States Army to the headquarters of the 27th Engineer Battalion, Buchanan, Puerto Rico. Al is doing sanitary engineering work with the Army. — Glenn Soash, XV, is working for Du Pont in Charleston, W. Va. — Daniel Norman, VIII, is with the New England Spectrochemical Labs in Boston. — This completes the news flashes for this month. More letters will be appreciated. — ANTON E. HITTL, *General Secretary*, 109 Shepard Avenue, Kenmore, N.Y. ROBERT E. SAWYER, *Assistant Secretary*, 55 Robinwood Avenue, Jamaica Plain, Mass.

1937

The really astounding bit of news this month concerns Vic Kron. I'll wager you will be fully as surprised as I was when you hear what he has to say: "Last September, I left International Business Machines Corporation to return to college, but instead of Technology, I chose one with more of a campus (coed) and also a football team. The purpose behind the change was to get into medicine, if you can imagine a Tech mechanical engineer as an M.D. At any rate, I have started, and I look forward to the hard life that goes with being a doctor. The college is the University of Rochester; at present I am in the arts college, taking a few premed courses I overlooked while at the Institute. These are German and biology — freshman courses! — and organic chemistry and comparative anatomy — junior or senior struggles. The last is probably the most interesting because it involves investigating what makes fish, lizards, and cats go. The dissection is fun and not at all the horrible affair most everyone imagines. Next, chronologically, was getting married; Miss Honor Stanton of Wilton, N.H., became Mrs. Kron on October 23; we are living at 178 Melrose Street, Rochester, and welcome any classmates who happen to be passing through the town." — Best of luck, Vic; we are all behind you and wish you much success.

Bob Ferguson took the fatal plunge on December 29 when he and Miss Dorothy Berry of Larchmont, N.Y., were married. They are living in New York at 249 East 56th Street. — Jim Newman has laid plans for a wedding in Chicago where he is living. Joann Williamson of Evanston is the better half to be. Others seriously considering the same course are Carl Pearson and Harriet Childs of Waltham, Mass. Congratulations, Carl; let us hear more about you. Grandville Jones and Maria Elena Moreno Aragon plan to be married in June. The dispatch I have says Mrs. Maria and later refers us to Miss Aragon. What can you say to clear this up, Deacon? Verner Kreuter, who used to "work" calculus with me, is engaged to Miss Jean Curtis Reed of Rochester.

Norm Birch has sent me a wonderfully long letter of some of the happenings in his section — he is now in Suffern, N.Y., at 6 Clinton Place. His letter is five pages long, and since space in this issue is somewhat limited, I have been forced to cut it a little, but it is mostly all here: "Away back on June 10," writes Norm, "Bob Thorson, the ironman of the boathouse, came to his proper senses and married Miss Frances Katherine Ogg of Dedham, Mass." Sometime later 'Bob, Frances, and Norm met at Milford, Conn., at Wayne and Eunice Pierce's home for a miniature reunion week-end including 'a morning at the beach and an afternoon swallowing dust at a motorcycle race.' About a month later, Norm was transferred to the East — he is with American Brake Shoe and Foundry Company — while at almost the same time Bob was transferred to Joliet, Ill. Bob and Rita

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Brauer have moved to Whiting, Ind., "where Bob is connected with the Standard Oil of Indiana. I hope I have that correctly noted — you should have heard him rave when I confused his firm with Socony-Vacuum, which has a plant right next door."

Norm works with several other Technology men, and spends his time in foundry and metallurgical research. Shortly before Christmas, he and "the Bobs, Brauer and Thorson, and wives" had another very pleasant get-together in Chicago while Norm was on a trip to Denver. "It was with definite regret that I caught the *Zephyr* for Denver that evening," he says. While in Colorado, Norm visited the old mining town of Leadville and crossed the Continental Divide twice in inspecting the mines of the Climax Molybdenum Company at Climax, Colo. "I knew that Finn and Fischer (they're still together), also Course III men, were in the vicinity, but could locate neither. Everything was fine except that the high altitude of 12,000 feet rather knocked me for a loop and I spent a day between trains in a Chicago hospital recuperating. Some of the boys at the laboratory seem to have heard some cock-and-bull story about excess Scotch and soda, but that high altitude is my story and I'm sticking to it." Too bad about the altitude, Norm. Better get busy; with all these fellows sporting a Mrs. on their arm, where are you?

Edwin Olmstead, II, sent me a clipping from the Tulsa, Okla., *Tribune*, which told of the marriage of Bill Chandler to Miss Louise Schleuter on Saturday, January 6. They are now living in Langley — Arkansas, I take it. Ed says: "I can't tell much more about Bill; it took me some time to find him, and after that I've seen him only a couple of times. Evidently things went from bad to worse at South Bend, so he migrated here to land a job with the builders of the Grand River Dam. He told me that while he was digging out the theory of continuous surfaces of reinforced concrete, he wished he'd paid a little more attention in Professor Smith's 2.21 class. Don't we all?"

"For my part, I'm equally far from the field of automotive engineering. After a graduate year, which was by far the most pleasant one at school, things started beautifully with the Wright Aeronautical Corporation in Paterson, N.J. At the end of a year there, working weekly rotating shifts, listening to engine noise, mopping floors, punching a time clock, and living in New Jersey had somewhat taken the edge off the payless glamour of the aircraft industry and 'the accumulation of valuable experience,' the Placement Bureau found me in a receptive mood for a change. There's been a large place in my heart for the Bureau ever since; Well Surveys has paid me the compliment of allowing me to serve as its mechanical engineering department, which means that all problems not involving vacuum tubes get tossed onto my desk. . . ." Ed goes on to tell about using the gamma radiations to locate the important deposits; he likes Tulsa and we cer-

1937 Continued

tainly hope we will hear more from him. — WINTHROP A. JOHNS, *General Secretary*, 245 Hale Street, New Brunswick, N.J.

1938

Although we haven't heard from our Secretary since his marriage (nor have we expected to), we understand that business has taken him and Mrs. Morgan to the West Virginia hills where we hear they will stay till the spring thaw. Incidentally, Ira Lohman, Jim Gilliss, and Frank Gardner were all ushers and reported the wedding to be a festive affair. — Also married in December was Paul Branning to Miss Helen Ryder of Newtonville, Mass. They are making their home in Philadelphia. — Engaged is Dave Irving to Miss Jean Stratton Richards of Cleveland, Ohio, who is now completing her senior year at Wellesley. The marriage is scheduled for June. Another recently announced engagement is that of Les Kornblith to Miss Barbara Levy of Schenectady, N.Y.

News of long-lost Frank Kearny has seeped up from New Orleans in the form of a letter. Frank is an engineer for a public service utility, and a co-department head at that! He also states that the political situation is worse than awful. — Latest news of our Prexy, John Wallace, is that he is now associated with Benny Howard, who turns out those marvelously fast planes. It is expected that they will now be even faster.

An interesting letter from Given Brewer, IX-B, came in just too late for the February notes. He has appointed himself unofficial secretary of the "foreign contingent that lent prestige to the lower floors of the north end of Wood during the years 1934 to 1938" (for which the Secretaries award him a medal of merit!), and writes as follows: "Gus Arino, II, who left during the junior year to join Franco's army, arrived in Spain in time to get into the campaign that broke the communist wave at Teruel on New Year's eve, 1939, and now is stationed with his regiment at Catalonia. Gus got through with a shrapnel wound in his arm. I know all of his friends will be sorry to learn that Gus's father passed away during the war. Yoshio Mikimoto is a production engineer at Showa Aircraft in Japan and gave a full-fledged demonstration of Japanese hospitality to my old boss at Lockheed, who went to Japan last winter. Ravi Kiroloskar is working at Westinghouse and studying music in his spare time. After working at Lockheed for thirteen months, I returned to the East on my vacation to get a new Aeronca 65, in which I toured Michigan, New York State, Maryland, New Jersey, and Massachusetts. While here the old damp New England air got me, and so I am living in New Bedford and working at WNBH in that city. When I was in California, I saw Charlie Maak, but I have not heard from him since."

A letter from Lou Bruneau states that he is working for his father and really enjoying the accounting business. He is taking courses for the state certified public accountant exams at the New York

University Wall Street division and states that "that dean is crazy — he put me on the dean's list." Lou saw Andy Stergion this summer down at the Woods Hole Oceanographic Institute and reports that Andy is getting along very well. He also ran into Jim Viles, who is running a commercial studio with a chum and doing free-lance photography. Jim recently turned out some excellent fashion photos for *Vogue*.

The Class was well represented at the midwinter gathering of Boston Alumni, with Ross Teel, Fred Kolb, Eb O'Brien, Leon Baral, and Irving Smith showing up for the supper and general festivities.

Now just by way of proof that these notes should be called Course X notes rather than anything else, we are presenting below, in abbreviated form, the results of a chain letter which was started recently by Dave Acker. It seems like a swell idea for news gathering, and at our next reunion your Secretaries will present a free drink to any and all who can successfully get such a document under way in the other Courses. The sample is as follows: From Dave Acker, (who has recently become engaged to Marion Bachelder of Athol, Mass.): "Still weighing small drops of fuel oil for Professor Hottel '24. Learned quite a bit about the combustion characteristics of Bunker C fuel, and now all that I have to do is improve it. At present I am testing the effect of several addition agents, using the same technique of weighing single particles before and after partial combustion."

From Bert Grosselfinger: "I spent the last two weeks of June on active duty at Fort Hancock, N.J., where I took part in a field inspection for the first time. Also had a peculiar experience as officer of the day. At 1:00 A.M. the sergeant of the guard woke me to report that he had found a bullet in the cell room. I got dressed, went to the guardhouse, had all the prisoners turned out, and then inspected the cell room. What a pile of unauthorized articles I found! Bullets in the brass polish cans, scissors under the mattresses, an officer's spur, civilian clothes, and a host of other things. The Monday after I returned from camp I started working in the catalytic cracking department of M. W. Kellogg Company. Spent six weeks correlating data on the catalytic reforming of naphtha. Then I was sent to the labs in Jersey City to remain about three months. I spent two weeks operating a pilot plant; nine weeks deriving some equations. Charlie King is also with Kellogg, designing towers and what not. I'm also going to New York University at night, and I met a fellow there who works with Frank Dowding in the Texas Company in New York City."

From Horace Homer: "When you last heard from me, I was in Quincy, in the propane labs at Cities Service. They hired another fellow, a chemical engineer from Michigan, and I broke him into the work and went on to research. I left on May 1 to work with Champion Lamp Company of Lynn. One of their engineers,

Everett Kelley '29, XVI, had started the preceding February to develop methods for making the new fluorescent lamps, so I went to work with him. It was just the type of work that I wanted. Something had to be done, and it was up to me to do it. We have now gone in under a General Electric license. Kelley and I are still working on development, but most of our time is spent in setting up a quality department for customer inspection. When the department is finally equipped with all its apparatus — the methods of manufacturing and specifications are already completed — we shall shift over to the quality department. All new developments and methods are still under us. So I am now the assistant quality engineer and a member of the American Institute of Electrical Engineers (I, the poor sap, who could get only a P from Professor Hudson '07, and you are fully aware of my abilities in the electrical engineering laboratory)."

From Arnold Kaulakis: "It was decidedly interesting to know what some of you fellows are doing to satiate the prime necessities of life. Since June, 1938, I have endeavored to arouse a few of the gang into some correspondence, but all attempts to continue it have failed. Another X man with the writer's cramp is Ollie Kangas. Since he is not on Dave's list, perhaps a few words about him may be of interest. Ollie is with Standard of New Jersey, doing some research in catalytic cracking. According to word from him late last spring, he was operating a couple of pilot plants obtaining data on a phase of catalytic cracking that he developed from the glassware stage."

"I am with the research and development staff of the Pan American Refining Corporation at Texas City, Texas. Our plant was made entirely new in 1934, and because of that fact is one of the most modern in the United States. We have three large Kellogg combination cracking units, total design capacity 90,000 barrels a day. In addition, there are a catalytic polymerization plant, several pipe stills, a treating plant, and so on. We do little of the direct research involving pilot plants and the like; ours is mostly development on the existing units. In addition to following the operations of a cracking unit quite thoroughly and spotting means for improving operations and efficiency of various systems of the unit, we have a variety of problems to work on. The nice thing about the job is that every problem is different, and we have a nice chance of getting a real broad picture of refining. Galveston, where I live, is fourteen miles from the refinery and as a city is not too bad. However, the weather in summer is so hot and humidity so high that it almost drives one mad at times. The winters would be pleasant (average temperature 65 to 70 degrees) except for the humidity which again is so high that you are still without the benefits of the invigorating northern climate."

From Jack Chapin: "Come on to Buffalo and look over the Bethlehem Steel Company. Well, fellows, it's big, danger-

1938 Continued

ous, and fascinating. You really stand in for a thrill when you see a blast furnace cast for the first time. Molten iron at 2,900 degrees Fahrenheit comes surging out, the sparks fly, and the whole place lights up. Then there's the open-hearth tap, with liquid steel at 3,000 degrees Fahrenheit — just as fascinating.

My job, that of assistant director of the Practice Station here, includes everything from taking visiting groups around the plant to secretarial duty. The work at the station (for me) consists in typing all the correspondence and orders, keeping the inventory of everything in the station, and making sure that sufficient equipment is always on hand. I correct the flow sheets and some of the reports, conferring with the report leaders after corrections have been suggested. I like the job very much. I can answer most of the questions at the beginning, but when the station gets along, the questions become tougher.

From Frank Knight, in Bangor, Maine: "I must remind you fellows that the winter night sets in up here during the latter part of August, when the last dog team for the States pulls out. From then until the first of July, we huddle in small shivering groups in our igloos, chewing on whale meat and old shoes. Seriously, Bangor is a nice place to live, as you Practice School men remember, or don't you? The Penobscot River is a convenient place to park one's yacht, and the airport is right handy. We all keep our planes out there — it's so clubby. As I was saying, one might well have knocked me over with a feather, even a small feather, when they asked me to be general manager of the Eastern Corporation. But what could I do? It was evident that there was only one man who could fill the job. So I accepted, and things are certainly running smoothly. And the yacht is running fine, too. There's nothing I like better to do after a hard day at the office than to throw on an old \$200 suit and go down and tinker with the yacht or putter around the trimotor. Such fun!"

From Lewis Hull, who is now with F. J. Stokes Machine Company, Philadelphia: "While stumbling home from night work the other morning, I crawled over the enclosed, which had evidently been misplaced by one of Mr. Farley's representatives. Rather than impede the path of progress, I am hastily forwarding it to you even though I must sell the last stick of furniture to accumulate the necessary postage fee. You will therefore pardon the typing, as I am sitting on the floor. How are you doing with that new Crosley, Barny?"

From Bernard Mehren: "Looks like I'll have to dig out Perry's *Handbook* to find out what you fellows are doing. You see, I've just about deserted the ranks of engineering. Spent a year with Crown Can in Philadelphia, learning all about beer from intake to discharge, can linings, can production machinery, food packing, and such. While there I had occasion to work on a can lining for a grapefruit base called Squirt. I had the chance to compare it with a great number of other fruit concentrates, and the story after that is brief: My brother and I headed for the great West, organized the Squirt Beverage Company, and proceeded to bottle and distribute the drink in San Diego and Imperial counties. We buy the concentrate from the Squirt Company, add sugar and carbonated water, slap a cap on the bottle, and watch the nickles roll in. In addition to being production and control man, advertising and sales manager, purchasing agent and accountant for our own company, I am also chief chemist and consulting engineer for the Squirt Company, with bottlers in 210 cities from Washington, D.C., to Oakland, Calif." — DALE F. MORGAN, *General Secretary*, 6 Avon Road, New Rochelle, N.Y. LLOYD BERGESON, *Assistant Secretary*, 885 Beacon Street, Newton Centre, Mass.

1939

Despite the fact that many notes arrive with "still single" postscripts, we learn from other sources of information that Cupid is still on the rampage. Earl Larson, II, in addition to being a lab technician at B. F. Goodrich Company in Akron, became engaged to Miss Anne Haakonsen of Andover in October. They were married late in December. — Gus Hunicke, now with Hyatt Roller Bearings Division of General Motors in Harrison, N.J., writes: "Getting married April 6, and sitting on top of the world." Continuing with Course II activities, Gordon Holbrook's engagement to Miss Edith L. Stokes of West Orange, N.J., was announced late in December. — James Keith Gilmore, XII, has likewise been treading the rosy path, having become engaged to Miss Agnes Minot of Chestnut Hill in December. — Woody Baldwin, XV, married Miss Phyllis Horne of Brookline just prior to the New Year and the couple are making their home near Hartford.

Meredith Wardle, XVI, who is with Curtiss-Wright in Buffalo, N.Y., is engaged to Miss Letitia Stimson of Miami, Fla.

From Aaron White, Secretary of Course XIX (hint), came the following: "As 1939 passes into history (this was not

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written New Year's eve), I can check back on our group and note with pride that the twenty XIX men are all working or furthering their education. I hope to be able to maintain sufficiently thorough contact with my Building colleagues and report equally encouraging news from time to time. At the Field Day dance, one-fifth of the twenty held their first reunion. Roy Haworth, Shorty Merriman, Morris Nicholson, and yours truly were all present. Haworth is working for the Bridgeport Brass Company; Shorty, competing, with the Scovill Manufacturing Company in Waterbury, Conn.

"Paul Farwell has moved a few miles up the river to attend the Harvard Business School; Torchy Fabens, II, sits near by in most of his classes. Walter Johnson, after working during the summer for American Smelting and Refining in Utah, has taken a leave of absence and is back at the Institute for his master's. Zeke Losco is on a fellowship at Carnegie Tech and is to be employed at the Westinghouse Electric and Manufacturing Company's research laboratories during summer vacations. I haven't heard from Fred French, but if his original plans were carried out, he is working for the American Brass Company in Waterbury, Conn. I also have reason to believe that Fred was married to a lovely Wellesley alumna soon after graduation. Stu Arnold, from last reports, is with Inland Steel Company and was last seen in their Indiana Harbor office."

Henry Landwehr, X, was married on December 15 to Miss Elizabeth Doris Currier of Wilmington, Mass. — Baron Sternberg writes: "I am now in training for the engineering division of the Procter and Gamble Company and am enjoying life very much, although the holiday season was quite a strain without the holidays. — Joe Mazur, VI, says: "You probably haven't heard that I got a job with the Yale and Towne Manufacturing Company in Stamford, where I am working on the phantom doorman, an automatic device with great possibilities." — Finally, a tribute to Harold Snow whose thesis won the first annual essay contest of the Association of Official Agricultural Chemists, the thesis being, "Purification of Cellulose with Acetic Acid." Our apologies for not having had this item coincidentally with its appearance in the Technology Men in Action section of The Review [January], but our heartiest congratulations, nevertheless. — STUART PAIGE, *General Secretary*, Box 207, Greenwich, Conn. MORRIS E. NICHOLSON, *Assistant Secretary*, M.I.T. Graduate House, Cambridge, Mass.

Come Back to Tech —

ALUMNI DAY — JUNE 3



He Set a Trap for Lightning

STALKING thunderstorms is nothing unusual for Karl McEachron. He's done it for years—photographing lightning bolts, studying struck trees and buildings, enticing lightning to strike his equipment and write a record of its voltage and power. He even has in his laboratory a machine to imitate it—a 10-million-volt lightning generator like the one seen last year by two and a half million visitors to the G-E building at the New York World's Fair.

Dr. McEachron's work has won him world recognition as an authority on lightning. And at Pittsfield, Massachusetts, in the G-E High Voltage Laboratory, he and his associates

are learning how to outwit this "outlaw" of nature—how to keep it from interfering with your electric service. That's one reason why a thunderstorm isn't the signal for a "black-out" in your home, as it used to be. Your lights may blink, but they seldom stay out.

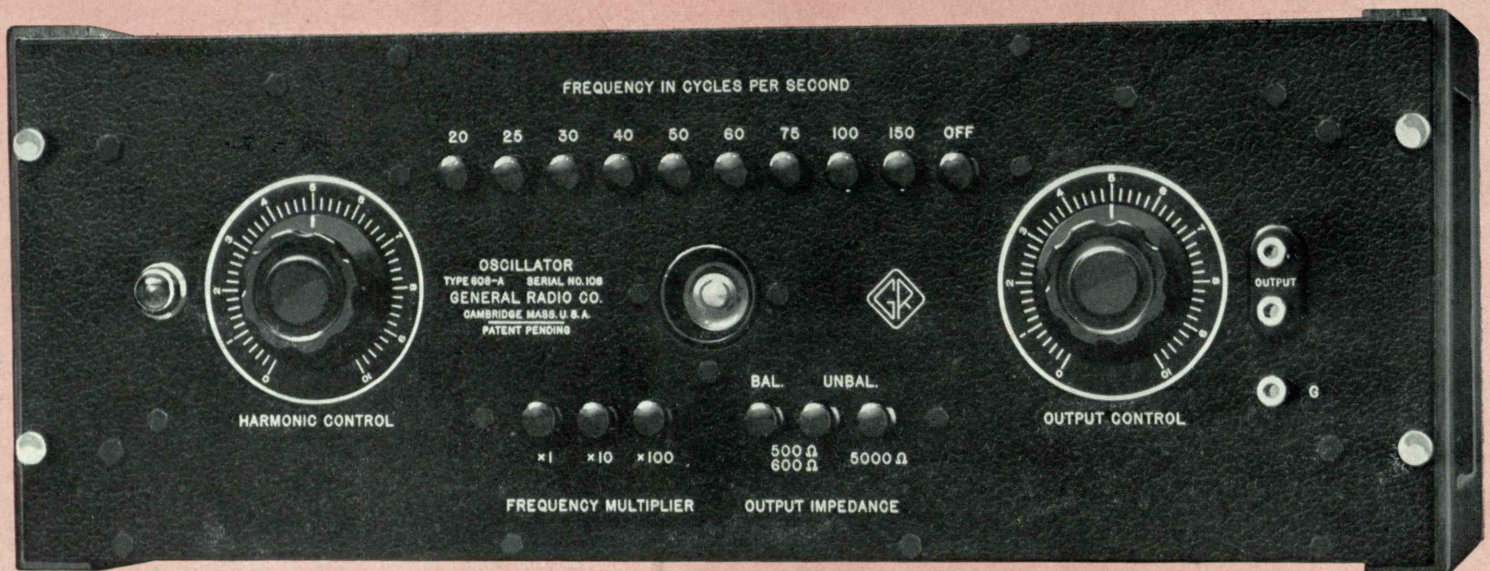
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